WHITE PINE BLISTER RUST CONTROL

IN THE

NORTHWESTERN REGION

January 1 to December 31, 1947

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine
Division of Plant Disease Control
Blister Rust Control
618 Realty Building
Spokane, Washington

CONTENTS

	Page
White Pine Blister Rust Control in the Northwestern Region	1-10
Leadership, Coordination and Technical Direction by Bureau of Entomology and Plant Quarantine	1-2
Omnibus Tables	3-4
Cooperative Blister Rust Control on State and Private Lands	5-6
Blister Rust Control on National Forests, Region One	7-8
Blister Rust Control on National Parks	9-10
Blister Rust Control, Inland Empire	11-61
Summary	11-18
Clearwater Operation	19-28
St. Joe Operation	29-37
Coeur d'Alene Operation	38-44
Kaniksu Operation	45-53
Montana Operation	54-61
Blister Rust Control on Mount Rainier National Park	62-65
Blister Rust Control on Glacier National Park	66-69
Blister Rust Control on Yellowstone National Park	70-73
Developmental Work in Methods of Ribes Eradication, and Progress of Ribes Ecology and Disease Control Studies in the Northwestern Region	74-114
I. Summary	74-78
II. Field Work	79-111
Chemical Methods	79-99
Herbicides Tested in 1947	83-85
Clearwater Chemical Tests	86-88
St. Joe Chemical Tests	89-90
Coeur d'Alene Chemical Tests	91-94
Kaniksu Chemical Tests	95-97
Ribes Decapitation Tests	98-99
Disease Control Studies	100-111
Bingham's Rust Damage Studies	100-108
Stillinger's Disease Investigations	109-111
III. Laboratory, Greenhouse, and Special Activities	112-114
Photographic and Educational Work	115-117

Page

Appendix

Accounts (M. L. McWold) - Bureau of Entomology and Plant Quarantine 1-3

Organization of the Northwestern Regional Office 4

WHITE PINE BLISTER RUST CONTROL IN THE NORTHWESTERN REGION

January 1 to December 31, 1947

Herman E. Swanson, Regional Leader

The Bureau of Entomology and Plant Quarantine, U. S. Forest Service, National Park Service, State of Idaho, and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations of North Idaho were directly engaged in the ribes eradication program in the Northwestern Region.

Four developments were of particular importance to blister rust control in the Northwestern region in 1947. (1) The drastic reduction in federal aid for control work on state and private lands was a severe setback to a balanced program in this region. Extreme fluctuations in funds disrupt plans and greatly increase costs. (2) The substantial programs retained on national forest and National park lands resulted in a great increase in the over-all accomplishments in the region. (3) The damage which blister rust is capable of inflicting on older tree age classes is becoming visible in pole sized timber. (4) Developments in chemical methods of ribes eradication are highly promising for great reductions in costs of control.

Progress in 1947. Reduction in fiscal year 1948 funds resulted in a drop from 64,490 effective man-days in calendar year 1946 to 58,712 man-days in 1947. This was due primarily to the 65 per cent reduction in federal aid for work on state, private and intermingled lands. Fifteen camps with well-organized and trained crews were prematurely closed in August with several weeks of good working weather remaining. Even with the reduction, progress in acreage worked went from 56,372 acres in 1946 to 81,241 in 1947, an increase of 44 per cent.

This improvement was the result of several factors. Labor conditions. An adequate supply of labor was available for the first time since 1941. Minimum age requirement was raised to 18 years. Efficient and stable crews resulted with far less turnover. Fire fighting. Less disruption and loss of time from project work occurred because of a light fire season. Training procedures. Training of blister rust workers was greatly improved through use of large sized training charts. Laborers became proficient in less time than formerly required as techniques of the job were more readily conveyed to the worker. Chemical eradication. Heavy ribes concentrations which formerly were man-day absorbing jobs were treated with the new herbicides. Not only was the man-day requirement substantially reduced but also the removal of these areas from tiresome hand pulling had a favorable effect on crew morale.

As a result of control work in 1947, 30,189 acres were placed on maintenance and 4,928 acres of previously protected area reverted to an unworked status as a result of logging disturbances.

Infection conditions. Damage from blister rust is appearing in many places in pole sized timber as a result of early infection occurring between 1923 and 1937. Damage studies were expanded in 1946 to measure the effect of the potential losses on stocking. Climatic conditions in the fall of 1947 and the heavy infection on ribes portend a year of heavy spread of infection to white pine.

In scouting for spread of the rust toward the pine areas of Wyoming and Colorado, blister rust infection was found on Ribes petiolare on Trail Creek near Victor, Idaho, in association with Pinus flexilis. The location is in Teton County, Idaho, on the Targhee National Forest. Although the rust was found about 10 miles east of this point in Wyoming in 1946, this new location is 150 miles south of rust locations previously reported in Idaho.

Chemical methods of ribes eradication. For want of a chemical sufficiently low in price and at the same time effective on all ribes species, chemical methods in practical control work have been restricted largely to use of either 2,4-D or Ammate in stream type. Considerable experimentation is being done in methods of spraying in upland types since it seems likely that a satisfactory chemical will soon be found. Results show that areas can be covered for one-half the cost of hand pulling methods. Also, if a satisfactory chemical is found it is expected that one or two workings will suffice where three or four workings are required by hand methods.

In 1947, four power sprayers mounted on 1½-ton trucks and ten portable power sprayers were used. Forty-one Hi-Fog guns, portable knapsack sprayers with a pressure cylinder operating with 350 lbs. to 1,000 lbs. pressure, were used. With the Hi-Fog gun an acre can be given complete coverage with one to three gallons of spray, and it is a valuable piece of equipment for hormone sprays. From the equipment standpoint the project is ready to launch a large ribes eradication project with chemicals where effective results may require either large or small volumes of solutions.

Contracting ribes eradication. A start was made in letting contracts for the eradication of ribes on small areas. Three contracts were let by the Forest Service and the results are presented in the Coeur d'Alene and Kaniksu reports. Experiments in this region and in California and Oregon show that excellent results can be achieved by this system at a much lower cost than in normal procedures.

SUMMARY OF PROGRESS

A summary of blister rust control activities in the Northwestern Region is presented in the following tables:

TABLE 1

SUMMARY OF RIBES ERADICATION BY STATES AND OPERATING AGENCIES - 1947

State	Operating Agency	First Working			Second Working			Other Workings			All Workings			Per Acre		Number of Camps	Total Seasonal Employees
		Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Ribes	Man-Days		
Idaho	BEPQ	6,135	629,086	4,700	13,012	487,442	8,138	10,081	112,928	5,316	29,228	1,229,456	18,154	42	.62	15	782
	FS	4,896	218,720	3,697	13,279	348,161	10,708	12,214	267,409	11,059	30,389	834,290	25,464	27	.84	24	1,015
	Subtotal	11,031	847,806	8,397	26,291	835,603	18,846	22,295	380,337	16,375	59,617	2,063,746	43,618	35	.73	39	1,797
Montana	FS	2,638	227,998	2,200	719	127,276	1,485	773	39,962	1,238	4,130	395,236	4,923	96	1.19	5	190
	NPS	738	111,150	860	687	63,285	902	408	58,426	398	1,833	232,861	2,160	127	1.18	3	67
	Subtotal	3,376	339,148	3,060	1,406	190,561	2,387	1,181	98,388	1,636	5,963	628,097	7,083	105	1.19	8	257
Washington	FS	3,053	255,351	1,522	2,463	84,489	1,273	3,134	42,365	1,239	8,650	382,205	4,034	44	.47	2	97
	NPS							2,134	28,136	805	2,134	28,136	805	13	.38	1	24
	Subtotal	3,053	255,351	1,522	2,463	84,489	1,273	5,268	70,501	2,044	10,784	410,341	4,839	38	.45	3	121
Wyoming	NPS	4,877	382,917	3,172							4,877	382,917	3,172	79	.65	2	91
All States	BEPQ	6,135	629,086	4,700	13,012	487,442	8,139	10,081	112,928	5,316	29,228	1,229,456	18,154	42	.62	15	782
	FS	10,587	702,069	7,419	16,461	559,926	13,466	16,121	349,736	13,536	43,169	1,611,731	34,421	37	.80	31	1,302
	NPS	5,615	494,067	4,032	687	63,285	902	2,542	86,562	1,203	8,844	643,914	6,137	73	.69	6	182
Total		22,337	1,825,222	16,151	30,160	1,110,653	22,506	28,744	549,226	20,055	81,241	3,485,101	58,712	43	.72	52	2,266

TABLE 2

ACREAGE WORKED BY LAND OWNERSHIP - 1947

Land Ownership	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
National Forest Region 1	13,417	18,642	15,676	47,735
National Park	5,615	687	2,542	8,844
Public Domain		245	630	875
State and Private	3,305	10,586	9,896	23,787
Total	22,337	30,160	28,744	81,241

TABLE 3

SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1947

State	Cooperative Funds		Total Federal Funds	Total All Funds	Federal Funds				Cooperative Funds Direct Aid			Expenditures Ribes Eradication
	Total (Direct and Indirect Aid)	Direct Aid			Entomology and Plant Quarantine 3101	Entomology and Plant Quarantine 3103	Forest Service	Park Service	State	Private	Total	
Idaho	$32,937.35	$30,937.35	$1,121,544.33	$1,154,481.68	$ 82,741.49	$111,280.00 (I) 344,322.01	$583,200.83		$15,028.11	$15,909.24	$30,937.35	$1,064,280.00
Mont.	1,000.00		209,745.73	210,745.73	17,211.68		141,590.53	$ 50,943.52				192,303.00
Wash.	1,000.00		129,896.39	130,896.39	17,001.23		97,020.00	15,875.16				108,006.00
Colo.	200.00		1,241.56	1,441.56	500.00			741.56				
Wyo.	200.00		65,222.91	65,422.91	3,973.07			61,249.84				61,250.00
Total	$35,337.35	$30,937.35	$1,527,650.92	$1,562,988.27	$121,427.47	$455,602.01	$821,811.36	$128,810.08	$15,028.11	$15,909.24	$30,937.35	$1,425,839.00

(I) Intermingled lands.

TABLE A

STATUS OF RIBES ERADICATION BY STATES - ALL OWNERSHIPS, DECEMBER 31, 1947
Accumulative Series - Net

State	Total Acres		First Working		Second Working	Other Workings	On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P.& Prot.Zone)	Acres	Per Cent	Acres	Acres	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
Idaho	1,881,507	2,254,664	1,512,912	67	410,408	120,776	489,488	22	741,752	1,023,424
Montana	204,411	212,781	141,747	67	15,811	6,724	77,203	36	71,034	64,544
Washington	140,697	152,964	116,258	76	44,489	23,488	38,194	25	36,706	78,064
Subtotal	2,226,615	2,620,409	1,770,917	68	470,708	150,988	604,885	23	849,492	1,166,032
Wyoming*	230,778	230,778	28,651	12	152		13,350	6	202,127	15,301
Colorado*	206,000	206,000	14,859	7	1,962		8,000	4	191,141	6,859
Subtotal	436,778	436,778	43,510	10	2,114		21,350	5	393,268	22,160
Total	2,663,393	3,057,187	1,814,427	59	472,822	150,988	626,235	20	1,242,760	1,188,192

TABLE B

SUMMARY OF STATUS OF RIBES ERADICATION BY LAND OWNERSHIP, DECEMBER 31, 1947
Accumulative Series - Net

Land Ownership	Total Acres		First Working		Second Working	Other Workings	On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P.& Prot.Zone)	Acres	Per Cent	Acres	Acres	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
National Forests R-1	1,195,209	1,403,219	1,064,024	76	274,215	75,525	353,930	25	339,195	710,094
National Forests R-2 & 4	*421,000	421,000	36,619	9	1,962		17,000	4	384,381	19,619
Subtotal	1,616,209	1,824,219	1,100,643	60	276,177	75,525	370,930	20	723,576	729,713
National Parks	24,087	24,087	14,851	62	6,581	9,700	10,000	42	9,236	4,851
Public Domain	21,289	29,409	16,727	57	6,235	2,360	5,509	19	12,682	11,218
Subtotal - Interior	45,376	53,496	31,578	59	12,816	12,060	15,509	29	21,918	16,069
Total - Federal	1,661,585	1,877,715	1,132,221	60	288,993	87,585	386,439	21	745,494	745,782
State and Private Lands	1,001,808	1,179,472	682,206	58	183,829	63,403	239,796	20	497,266	442,410
Total	2,663,393	3,057,187	1,814,427	59	472,822	150,988	626,235	20	1,242,760	1,188,192

*Indefinite

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS

Calendar Year 1947

Herman E. Swanson, Regional Leader

Cooperative blister rust control on state and private lands in Idaho in 1947 was conducted by the Bureau of Entomology and Plant Quarantine in cooperation with the State of Idaho, and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations. Ninety-five per cent of the state and private lands in the control area of the Northwestern Region lies in North Idaho. State and private lands in Montana and Washington are relatively small and scattered. Some of these are protected incidentally with the protection of federal lands.

The drastic reduction of 65 per cent in the amount of federal allotments in the fiscal year 1948 for work on state, private, and intermingled lands was a severe setback to this program. The full effects of the reduction will not be apparent until the 1948 season work. The cooperative program that is now possible under the funds from federal, state and private sources is but 13 per cent of the annual requirement over the next five years to complete protection on 300,000 acres of top priority white pine.

The camps and workers on the cooperative field project were distributed as follows:

Operation	Number Camps	Number Workers
Clearwater	5	240
St. Joe (Potlatch)	5	257
Kaniksu (Priest Lake)	5	285
Total	15	782

On the Kaniksu and St. Joe operations a large part of the work was performed in sapling and pole sized stands. As a consequence, a considerable portion of the area worked was placed on a maintenance basis, approximately 17,000 acres. Work in the Clearwater territory is largely on cutover lands on which an average of three workings will be required.

A full description of the cooperative work will be found in the Clearwater, St. Joe and Kaniksu reports. A summary of the cooperative program in 1947 follows:

1. Allotments

	Fiscal Year 1947	Fiscal Year 1948
Federal		
State and Private Lands	$337,711.00	$125,000.00
Intermingled Lands	320,000.00	
State of Idaho	15,000.00	20,000.00
Clearwater T.P.A.	6,422.40	6,502.78
Potlatch T.P.A.	5,420.30	5,420.30
Priest Lake T.P.A.	4,066.54	4,055.00
Total	$688,620.24	$160,978.08

2. Expenditures - Calendar Year 1947

Operation	State and Private	Federal	Total
Clearwater	$13,564.76	$143,612.56	$157,177.32
St. Joe (Potlatch)	9,818.04	151,809.90	161,627.94
Kaniksu (Priest Lake)	7,554.55	160,179.55	167,734.10
Total	$30,937.35*	$455,602.01	$486,539.36

*1947 - State $15,028.11, Private $15,909.24
1928-1947 - State $223,470.78, Private $183,252.39

3. Cooperative Ribes Eradication in Idaho, 1947

	Acres Worked					Per Acre	
Operation	Initial	Rework	Total	Man-Days	Ribes	Man-Days	Ribes
Clearwater	1,923	5,311	7,234	5,958	555,298	.82	77
St. Joe	20	9,429	9,449	6,347	110,387	.67	12
Kaniksu	4,192	8,353	12,545	5,849	563,771	.47	45
Total	6,135	23,093	29,228	18,154	1,229,456	.62	42

4. State and Private Lands Worked in 1947

	Acres Worked			
State	First	Second	Third	Total
Idaho	3,142	10,076	9,612	22,830
Montana	3	216	174	393
Washington	160	294	110	564
Total	3,305	10,586	9,896	23,787

5. Progress on State and Private Land, 1923-1946 (Net Acres)

	Acres Worked					
State	First	Second	Third	Acres on Maintenance	Acres Unworked	Total Acres in Control Area
Idaho	639,052	169,510	56,598	214,100	477,243	1,116,295
Montana	19,732	2,591	2,014	13,821	15,025	34,757
Washington	23,422	11,728	4,791	11,875	4,998	28,420
Total	682,206	183,829	63,403	239,796	497,266	1,179,472

BLISTER RUST CONTROL ON NATIONAL FORESTS IN REGION ONE

Calendar Year 1947

Herman E. Swanson, Regional Leader

Blister rust control in 1947 was conducted by the Forest Service on six national forests. The Bureau of Entomology and Plant Quarantine assisted in the work as in previous years.

Control work on national forest lands is presented in reports for each of the national forests. The following report briefly summarizes the work.

While project allotments were somewhat smaller for the 1947 program resulting in a drop in effective man-days from 38,269 in 1946 to 34,421 in 1947, acreage covered increased from 25,657 acres in 1946 to 43,169 in 1947, an increase of 68 per cent. Several developments contributed to this fine showing. A better class of labor and a light fire season were important factors. Interruptions for fire fighting were not serious and most camp crews worked a comparatively full season.

Logging practices and subsequent stand improvement work on national forest lands in recent years have left the blister rust control forces with fewer high cost and difficult ribes eradication jobs. In the past, heavy ribes eradication on logged areas was taking too high a portion of the control effort.

New chemicals and spraying equipment were employed to good advantage. The Forest Service secured 31 Hi-Fog guns, a back pack sprayer operating at high pressures, for applying 2,4-D. Later in the season, portable power sprayers for applying 2,4-D or Ammate were secured. Four large power spray rigs mounted on 1½-ton trucks were made available to the Forest Service by the Bureau of Entomology and Plant Quarantine. For want of a chemical effective on all ribes species in upland sites, chemical eradication has had relatively small use. In handling the difficult and heavy concentrations of ribes this limited use has done a great deal to lower average costs.

The following tabulations summarize the expenditures and accomplishments in blister rust control by the Forest Service and present the net progress on national forest lands:

1. Expenditures by Forest Service, 1947

Clearwater	$126,138.88
St. Joe	216,530.01
Coeur d'Alene	139,647.30
Kaniksu	197,904.64
Cabinet	58,888.00
Kootenai	82,702.53
Total	$821,811.36

2. Expenditures by Forest Service, 1930-1947

Forest	Regular	Emergency	Total
Clearwater	$1,171,601.55	$ 413,454.80	$1,585,056.35
St. Joe	2,283,103.66	383,340.06	2,666,443.72
Coeur d'Alene	1,274,764.75	669,809.81	1,944,574.56
Kaniksu	1,287,299.50	458,055.36	1,745,354.86
Cabinet	505,437.26	258,476.52	763,913.78
Kootenai	293,835.95	28,233.00	322,068.95
Total	$6,816,042.67	$2,211,369.55	$9,027,412.22

3. Ribes Eradication by Forest Service Crews, 1947

Forest	Acres Worked			Man-Days	Ribes	Per Acre	
	Initial	Rework	Total			Man-Days	Ribes
Clearwater	2,644	3,672	6,316	5,232	258,854	.83	41
St. Joe	95	10,600	10,695	10,050	167,367	.94	16
Coeur d'Alene	909	5,206	6,115	5,890	246,301	.96	40
Kaniksu	4,301	11,612	15,913	8,326	543,973	.52	34
Cabinet	78	1,123	1,201	2,443	178,618	2.03	149
Kootenai	2,560	369	2,929	2,480	216,618	.85	74
Total	10,587	32,582	43,169	34,421	1,611,731	.80	37

4. Ribes Eradication on National Forest Lands, 1923-1947

Forest	Net Acres Worked			Acres on Maintenance	Acres Unworked	Total Acres
	First	Second	Third			
Clearwater	154,101	53,682	10,258	39,420	46,251	114,681
St. Joe	215,281	82,449	32,525	73,064	96,927	142,217
Coeur d'Alene*	307,979	53,150	14,350	95,735	53,067	212,244
Kaniksu	269,067	74,606	14,737	84,979	87,290	184,088
Cabinet	63,051	8,102	3,500	29,734	10,975	33,317
Kootenai	54,545	2,226	155	30,998	44,685	23,547
Total	1,064,024	274,215	75,525	353,930	339,195	710,094

*Includes 310 acres first working and 80 acres unworked on Mount Spokane operation.

BLISTER RUST CONTROL ON NATIONAL PARKS

Calendar Year 1947

Herman E. Swanson, Regional Leader

FOREWORD

Blister rust control in the Northwest conducted by the National Park Service in cooperation with the Bureau of Entomology and Plant Quarantine is described in separate reports for Mount Rainier, Glacier, and Yellowstone. The following report briefly summarizes the work on these national parks.

The 1947 program showed very good progress. Work on Mount Rainier has progressed to where the end of large-scale operations is in sight. This will come in 1948 or 1949 depending upon the size of the 1948 program. Work on Glacier is progressing well and previous estimates for the complete program appear adequate. In Yellowstone, some of the most difficult work on the Mount Washburn area is completed. Work on the Craig Pass area was started and completed in 1947. Little rework will be required on the unit because ribes were confined to only a small part of the area.

Chemical eradication. Developments in chemical eradication methods have been of particular value to the control program in the northwest. The age and size of ribes and the rough topography in which they grow, which prevails in the national parks, make hand pulling of ribes very difficult and in many cases impossible without the aid of chemicals. Herbicides, ammonium sulfamate and 2,4-D, have permitted a wider use of chemical methods both as sprays and as dry or wet applications to crowns of decapitated ribes. While most of the initial work has been completed, chemicals will greatly facilitate future work on the difficult locations where rework is necessary, and control areas should reach a maintenance status in a much shorter time.

Rocky Mountain National Park. A survey was conducted on the Longs Peak-Estes Cone area in Rocky Mountain National Park to secure information on which to base recommendations for a possible control area. Maps are being prepared showing pine and ribes distribution on the 5,128 acres surveyed together with estimates on the cost of protecting various units of this area. Prior to starting control work, the effectiveness of approved herbicides should be tested on the several ribes species. Accordingly, for 1948 it is recommended that a series of chemical tests be made, the results of which will have an important bearing on plans for future control work.

Spread of blister rust. In 1946 a significant spread of the rust was revealed by the discovery of infection on Ribes petiolare on Trail Creek east of Teton Pass in Teton County, Wyoming. In 1947, infection was found on the same species on Trail Creek near Victor in Teton County, Idaho. This is 10 miles west of the 1946 location. The accompanying map shows the known spread of blister rust.

Expenditures and progress. The following tabulations summarize the expenditures and progress of work on national parks in the Northwestern Region:

BLISTER RUST CONTROL, INLAND EMPIRE, 1947

By
Frank O. Walters
Assistant Regional Leader

Organization

The Inland Empire portion of the Northwestern Region includes northern Idaho, western Montana, and northeastern Washington, and supports the commercially important belt of western white pine.

This section is divided into five separate divisions or operations, as follows: 1. Clearwater; 2. St. Joe; 3. Coeur d'Alene; 4. Kaniksu, and 5. Montana. Each operation represents an administrative unit of lands similar in character.

The Bureau of Entomology and Plant Quarantine provides technical leadership for the control work on all land and administers all work on state and private lands. The Forest Service is responsible for administration of the work on national forest lands.

Labor Situation

The labor situation was the best since 1941. College men were available as well as a greater number of older experienced men. The general attitude was more sincere and turnover was less. More experienced supervisory personnel were on the job although the supply of men of camp superintendent caliber was limited. More competent cooks were available, resulting in fewer difficulties in operating the kitchens.

Accomplishments

During the current season more acreage was covered and a higher quality work performed than at any time since 1940 (see fig. 1). With the exception of one operation, less than one man-day per acre was expended (see fig. 2).

Had it been possible to maintain the program scheduled for state and private lands throughout the season without the drastic reduction caused by reduced allotments, greater accomplishments would have been made with materially lower costs.

Under existing circumstances we are committed to a policy of retrenchment; hence it is advisable to place areas on which work has been undertaken on a maintenance basis as soon as possible. Consequently most of the work was a follow-up on areas needing additional protection.

The Bureau camps on the St. Joe were able to place sizable areas of advance reproduction and pole on maintenance in the Purdue, Moose Meadows, Butterfield and Round Meadows areas. The Forest Service crews worked in pole and reproduction stands in the vicinity of Clarkia and in plantations near Emida, Idaho. A large block of pole in the east fork of Charlie Creek was placed on maintenance.

1. Expenditures by the National Park Service

National Park	Calendar Year 1947	All Years
Mount Rainier	$ 15,875.16	$ 96,549.42
Glacier	50,943.52	74,566.96
Yellowstone	61,249.84	77,800.10
Rocky Mountain	741.56	741.56
Total	$128,810.08	$249,658.04

2. Ribes Eradication on National Parks in 1947

	Acres Worked						Per Acre	
National Park	First	Second	Other	Total	Man-Days	Ribes	Man-Days	Ribes
Mount Rainier			2,134	2,134	805	28,136	.38	13
Glacier	738	687	408	1,833	2,160	232,861	1.18	127
Yellowstone	4,877			4,877	3,172	382,917	.65	79
Total	5,615	687	2,542	8,844	6,137	643,914	.69	73

3. Gross Acreage Worked on National Parks, 1930-1947

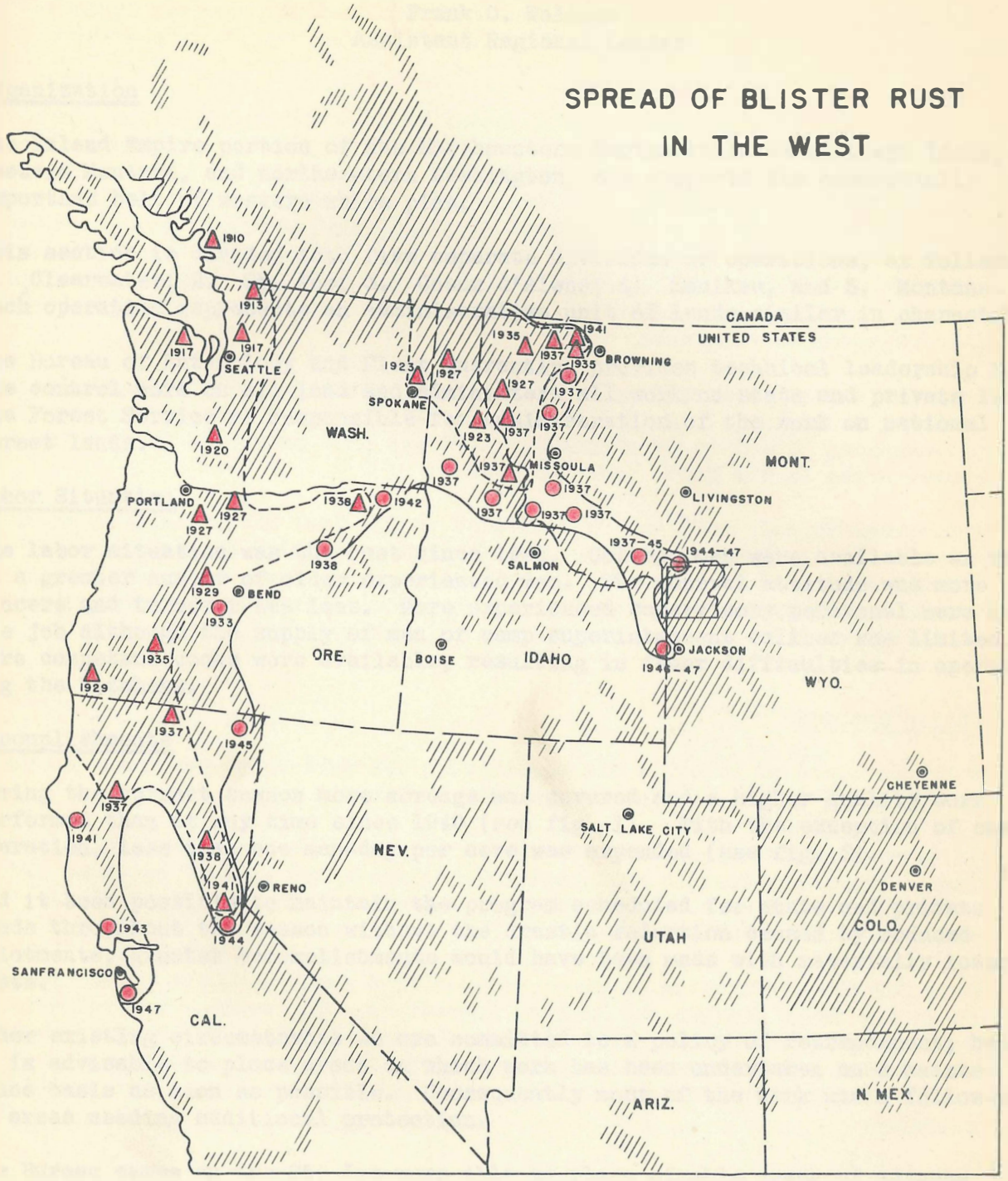
	Acres Worked						Per Acre	
National Park	First	Second	Other	Total	Man-Days	Ribes	Man-Days	Ribes
Mount Rainier	8,254	4,327	8,865	21,446	22,856	2,270,755	1.07	106
Glacier	4,379	2,889	1,055	8,323	8,993	973,586	1.08	117
Yellowstone	6,891	152		7,043	4,932	572,886	.70	81
Total	19,524	7,368	9,920	36,812	36,781	3,817,227	1.00	104

4. Work Status in Net Control Area

	Acres Worked					
National Park	First	Second	Other	Acres on Maintenance	Acres Unworked	Total Acres Control Area
Mount Rainier	3,581	3,540	8,645	3,000		3,581
Glacier	4,379	2,889	1,055	2,650	349	4,728
Yellowstone	6,891	152		4,350	1,887	8,778*
Rocky Mountain					7,000	7,000*
Total	14,851	6,581	9,700	10,000	9,236	24,087

*Indefinite

SPREAD OF BLISTER RUST IN THE WEST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UNITED STATES
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IDAHO
NEV.
MONT.
WYO.
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ARIZ.
N. MEX.
SEATTLE
PORTLAND
SPOKANE
BROWNING
MISSOULA
LIVINGSTON
SALMON
BEND
BOISE
JACKSON
RENO
SALT LAKE CITY
CHEYENNE
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On the Clearwater unit the Bureau camps worked on reproducing cutover lands in the vicinity of Pierce and Headquarters, Idaho. The Forest Service camps worked plantations and pole stands in the Beaver Creek drainage and cutover lands in the Musselshell district. Advance reproduction and pole stands were worked in the Moose City area.

Kaniksu Bureau camps rounded out a large block of pole and reproduction northeast of upper Priest Lake, most of the area going on maintenance. It was also possible to place most of the pole areas worked in Pack River and Grouse Creek in a maintenance classification. The Forest Service camps did eradication work in cutover areas in the lower west branch drainage, Dubius Creek, and the Gleason Meadow area. Stream type work was performed on Granite Creek above Nordman and on Priest River near the Priest River Experiment Station. A large block of pole in Bear Paw Creek and another on the Muddy Fork near Ione, Washington, was worked to maintenance standards.

The Coeur d'Alene crews worked in the extensive plantation areas in Jordan Creek and the West Elk drainage. A good cleanup was accomplished and portions of the older plantations placed on maintenance. Work was also performed in the pole and cutover areas in the North Fork drainage.

On the Kootenai Forest, work was concentrated in the Yaak River drainage where a heavy stream type program was carried on along the river and on Burnt Creek. Only a small amount of work remains to be done to place the pole areas worked this season in the Cyclone and Red Top drainages on a maintenance basis. The Cabinet Forest carried on work in reproduction stands in Big Creek and Rainy Creek.

Eradication Methods

With a better class of labor it was possible to use more three-man crews as independent units and depend less on the gang-type of crew.

One and two-man units were used in an effort to reduce the work time on areas with few ribes. Promising results were obtained and their use will be extended next year. Flanking crews were used to good advantage in making the final cleanup on pole and advance reproduction areas.

Contracts for the eradication of ribes on specified areas were let by the Forest Service on the Coeur d'Alene and Kaniksu operations. The weather was so unfavorable during the period of the contract that it was impossible for the contractors to earn a normal wage. A material savings to the Government resulted and the system holds sufficient promise to warrant further trials under more favorable circumstances.

Chemical Methods

Power equipment was used on four operations to apply ammonium sulfamate to stream type ribes of all species. Results were generally favorable and definite savings resulted. The Clearwater operation applied 2,4-D to upland cutover areas with power units, and used the Hi-Fog gun back pack unit for extensive stream type cleanup of Ribes petiolare.

PRODUCTION BY YEARS – ALL CLASSES OF CAMPS

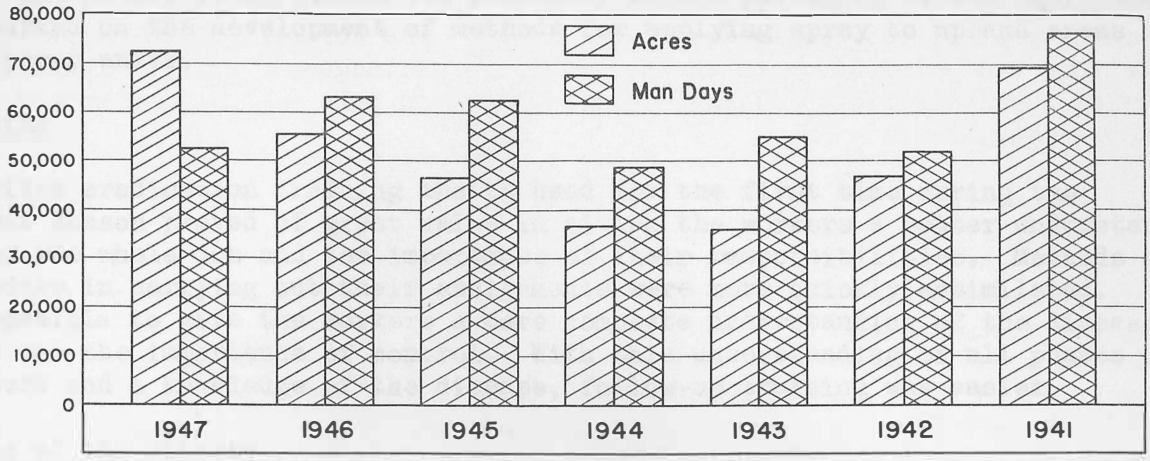


Fig. 1

PRODUCTION BY OPERATIONS 1947

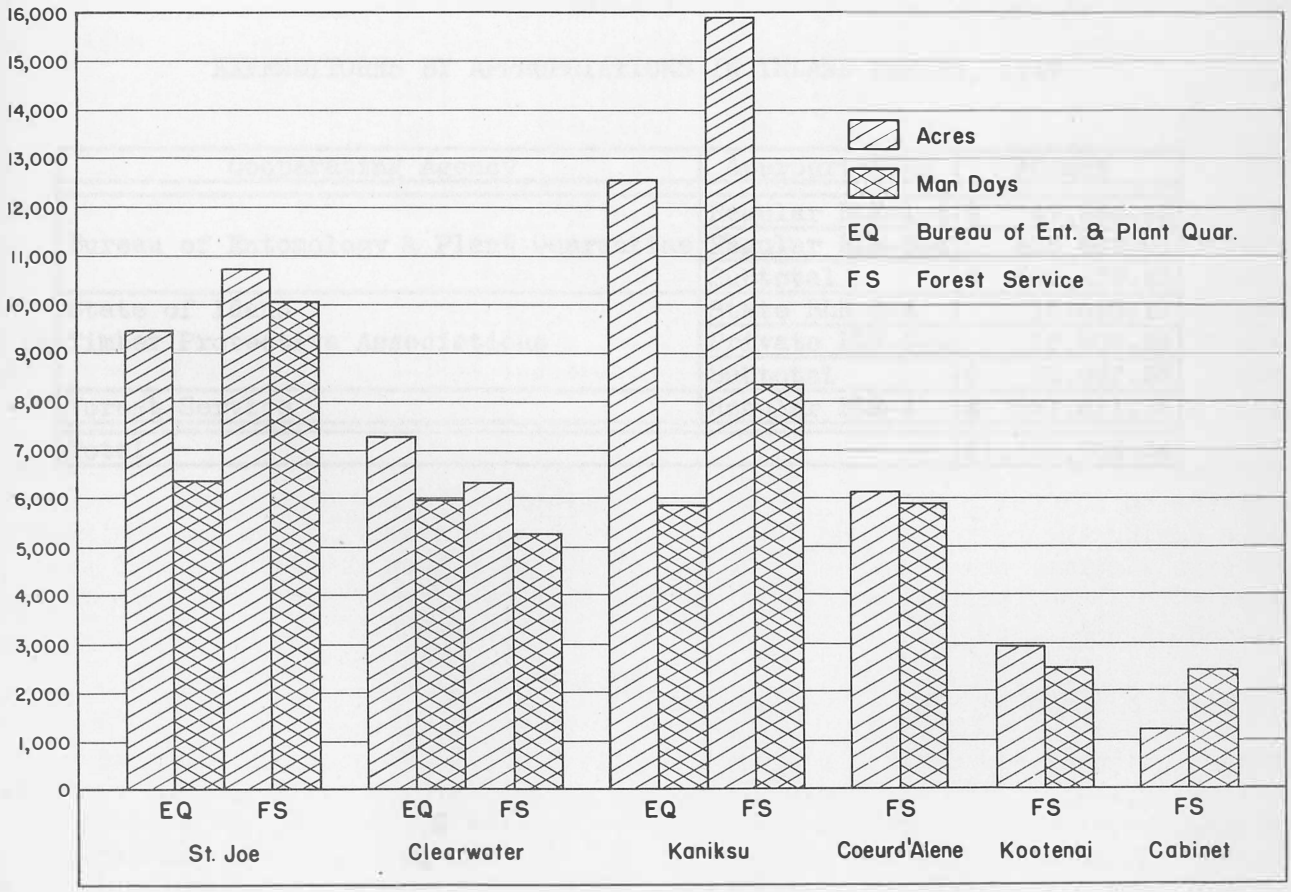


Fig. 2

After the active field season the permanent Bureau personnel tested equipment and worked on the development of methods for applying spray to upland areas with power units.

Training

The ribes eradication training charts used for the first time during the current season proved of great value in giving the workers a better understanding of the whole job and the importance of their responsibilities. Methods of procedure in carrying out their assignments were more quickly assimilated. It was possible to give the workers a more complete understanding of the disease cycle and the importance of control. With this understanding of all phases of the work and a knowledge of the disease, follow-up training was easier.

Status of the Disease

The full effect of the 1941 wave is now apparent over the entire white pine belt. Little subsequent infection has been noted except in areas of numerous ribes. The current season had all the indications of a bad wave year and areas not fully protected can be expected to suffer.

The statement of expenditures and costs is shown in the following tables by the cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS IN INLAND EMPIRE, 1947

Cooperating Agency	Appropriation	Amount
Bureau of Entomology & Plant Quarantine	Regular BLR-1-4	$ 47,353.62
	Regular BLR-3-4	455,602.01
	Subtotal	$ 502,955.63
State of Idaho Timber Protective Associations	State BLR-3-4	15,028.11
	Private BLR-3-4	15,909.24
	Subtotal	$ 30,937.35
Forest Service	Regular BLR-4	$ 821,811.36
Total		$1,355,704.34

TABLE 2

CLASSIFIED EXPENDITURES IN INLAND EMPIRE, 1947

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Cont.ribes erad.					$ 1,567.64	$ 1,567.64
Sal. perm. men	$44,916.99	$ 30,419.52		$ 75,336.51	54,781.48	130,117.99
Sal. temp. men		47,770.88	$ 5,254.79	53,025.67	77,695.26	130,720.93
Wages,temp.labs.		147,015.26	25,682.56	172,697.82	445,358.23	618,056.05
Subs. supplies		92,913.07		92,913.07	151,719.26	244,632.33
Equipment		31,795.71		31,795.71	31,238.08	63,033.79
Trucks		44,268.18		44,268.18		44,268.18
Travel & transp.	1,499.58	16,132.89		17,632.47	23,844.44	41,476.91
Other supplies	937.05	45,286.50		46,223.55	35,606.97	81,830.52
Total	$47,353.62	$455,602.01	$30,937.35	$533,892.98	$821,811.36	$1,355,704.34

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Plantation	1945-49	148	488	28,307	3.30	191
	Cutover	1945-49	743	673	86,819	.91	117
	Cutover (5)	1940-44	1,929	1,200	327,759	.62	170
	Cutover	1920-39	1,585	1,407	100,484	.89	63
	Reproduction	1910-39	2,041	1,700	78,135	.83	38
	Pole		9,243	4,719	436,670	.51	47
	Mature		202	201	25,067	1.00	124
	Miscellaneous		90	106	3,121	1.18	35
	Stream (1)		741	1,625	244,793	2.19	330
	Total		16,722	12,119	1,331,155	.72	80
Second	Plantation	1945-49	53	155	18,411	2.92	347
	Plantation	1940-44	55	144	1,640	2.62	30
	Cutover	1940-44	440	545	53,763	1.24	122
	Cutover	1920-39	1,509	1,675	50,952	1.11	34
	Reproduction	1910-39	11,664	10,305	287,919	.88	25
	Pole		12,659	4,874	314,720	.39	25
	Mature		328	115	2,259	.35	7
	Miscellaneous		321	147	3,753	.46	12
	Stream (2)		2,444	3,644	313,951	1.49	128
	Total		29,473	21,604	1,047,368	.73	36
Third	Plantation	1940-44	2,058	1,119	18,903	.54	9
	Cutover	1920-39	7,954	4,217	97,318	.53	12
	Reproduction	1910-39	8,268	8,122	169,090	.98	20
	Pole		5,915	3,400	62,478	.57	11
	Mature		341	80	4,779	.23	14
	Miscellaneous		90	99	1,324	1.10	15
	Stream (3)		1,576	1,815	108,772	1.15	69
	Total		26,202	18,852	462,664	.72	18
All Workings	Plantation	1945-49	201	643	46,718	3.20	232
	Cutover	1945-49	743	673	86,819	.91	117
	Plantation	1940-44	2,113	1,263	20,543	.60	10
	Cutover (6)	1940-44	2,369	1,745	381,522	.74	161
	Cutover	1920-39	11,048	7,299	248,754	.66	23
	Reproduction	1910-39	21,973	20,127	535,144	.92	24
	Pole		27,817	12,993	813,868	.47	29
	Mature		871	396	32,105	.45	37
	Miscellaneous		501	352	8,198	.70	16
	Stream (4)		4,761	7,084	667,516	1.49	140
	Total		72,397	52,575	2,841,187	.73	39

Chemical work included above:

	Stream				Upland		
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	304	652	15,183	(5)	61	102	14,700
(2)	295	579	9,120	(6)	61	102	14,700
(3)	644	701	6,855				
(4)	1,243	1,932	31,158				

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
INLAND EMPIRE

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	6,135	4,700	629,086	17,727	.77	103
		FS-Reg.	4,896	3,697	218,720	1,968	.76	45
		Total	11,031	8,397	847,806	19,695	.76	77
	Second	EQ-Coop.	13,012	8,138	487,442		.63	37
		FS-Reg.	13,279	10,708	348,161	2,780	.81	26
		Total	26,291	18,846	835,603	2,780	.72	32
	Third	EQ-Coop.	10,081	5,316	112,928	177	.53	11
		FS-Reg.	12,214	11,059	267,409	6,235	.91	22
		Total	22,295	16,375	380,337	6,412	.73	17
	All Workings	EQ-Coop.	29,228	18,154	1,229,456	17,904	.62	42
		FS-Reg.	30,389	25,464	834,290	10,983	.84	27
		Total	59,617	43,618	2,063,746	28,887	.73	35
Montana	First	FS-Reg.	2,638	2,200	227,998	8,313	.83	86
	Second	FS-Reg.	719	1,485	127,276	6,340	2.07	177
	Third	FS-Reg.	773	1,238	39,962	443	1.60	52
	All Workings	FS-Reg.	4,130	4,923	395,236	15,096	1.19	96
Washington	First	FS-Reg.	3,053	1,522	255,351	1,875	.50	84
	Second	FS-Reg.	2,463	1,273	84,489		.52	34
	Third	FS-Reg.	3,134	1,239	42,365		.40	14
	All Workings	FS-Reg.	8,650	4,034	382,205	1,875	.47	44
Total	First	EQ-Coop.	6,135	4,700	629,086	17,727	.77	103
		FS-Reg.	10,587	7,419	702,069	12,156	.70	66
		Total	16,722	12,119	1,331,155	29,883	.72	80
	Second	EQ-Coop.	13,012	8,138	487,442		.63	37
		FS-Reg.	16,461	13,466	559,926	9,120	.82	34
		Total	29,473	21,604	1,047,368	9,120	.73	36
	Third	EQ-Coop	10,081	5,316	112,928	177	.53	11
		FS-Reg.	16,121	13,536	349,736	6,678	.84	22
		Total	26,202	18,852	462,664	6,855	.72	18
	All Workings	EQ-Coop.	29,228	18,154	1,229,456	17,904	.62	42
		FS-Reg.	43,169	34,421	1,611,731	27,954	.80	37
		Total	72,397	52,575	2,841,187	45,858	.73	39

TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
INLAND EMPIRE

State	Working	Acres Worked																
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total						
												Federal			Other			
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	Total	State	Private	Total	Total
Idaho	First	4,883			13	4,896	3,006		1,598	1,531	6,135	7,889		7,889	1,598	1,544	3,142	11,031
	Second	10,783	242	1,338	916	13,279	5,190		3,546	4,276	13,012	15,973	242	16,215	4,984	5,192	10,076	26,291
	Third	9,736	510	259	1,709	12,214	2,317	120	1,175	6,469	10,081	12,053	630	12,683	1,434	8,178	9,612	22,295
	Total	25,402	752	1,597	2,638	30,389	10,513	120	6,319	12,276	29,228	35,915	872	36,787	7,916	14,914	22,830	59,617
Montana	First	2,635			3	2,638						2,635		2,635		3	3	2,638
	Second	500	3		216	719						500	3	503		216	216	719
	Third	599			174	773						599		599		174	174	773
	Total	3,734	3		393	4,130						3,734	3	3,737		393	393	4,130
Washington	First	2,893			160	3,053						2,893		2,893		160	160	3,053
	Second	2,169		80	214	2,463						2,169		2,169	80	214	294	2,463
	Third	3,024			110	3,134						3,024		3,024		110	110	3,134
	Total	8,086		80	484	8,650						8,086		8,086	80	484	564	8,650
Total	First	10,411			176	10,587	3,006		1,598	1,531	6,135	13,417		13,417	1,598	1,707	3,305	16,722
	Second	13,452	245	1,418	1,346	16,461	5,190		5,546	4,276	13,012	18,642	245	18,887	4,964	5,622	10,586	29,473
	Third	13,359	510	259	1,993	16,121	2,317	120	1,175	6,469	10,081	15,676	630	16,306	1,434	8,462	9,896	26,202
	Total	37,222	755	1,677	3,515	43,169	10,513	120	6,319	12,276	29,228	47,735	875	48,610	7,996	15,791	23,787	72,397

TABLE 6

RIBES SPECIES ERADICATED, 1947
INLAND EMPIRE

Working	Eradication Type	Acres	Ribes Species						Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Ribes triste	
First	Plantation (1945-49)	148	14,616	13,579	112				28,307
	Cutover (1945-49)	743	54,786	32,033					86,819
	Cutover (1940-44)	1,929	25,225	301,623	872	39			327,759
	Cutover (1920-39)	1,585	39,735	57,909	2,840				100,484
	Reproduction (1910-39)	2,041	59,201	11,548	1,062	5,807	517		78,135
	Pole	9,243	369,787	62,149	861	3,786	87		436,670
	Mature	202	19,697	5,370					25,067
	Miscellaneous	90	1,402	1,719					3,121
	Stream	741	153,912	9,705	27,990	38,043	11,343	3,800	244,793
	All Types	15,722	738,361	495,635	33,737	47,675	11,947	3,800	1,331,155
Second	Plantation (1945-49)	53	554	17,850	7				18,411
	Plantation (1940-44)	55	1,617	23					1,640
	Cutover (1940-44)	440	4,643	48,978	142				53,763
	Cutover (1920-39)	1,509	21,573	28,564	815				50,952
	Reproduction (1910-39)	11,664	208,767	70,810	2,763	5,579			287,919
	Pole	12,659	233,451	78,276	28	2,965			314,720
	Mature	328	2,247	12					2,259
	Miscellaneous	321	2,263	1,155		335			3,753
	Stream	2,444	225,345	7,525	38,537	29,551	153	12,840	313,951
	All Types	29,473	700,460	253,193	42,292	38,430	153	12,840	1,047,368
Third	Plantation (1940-44)	2,058	8,810	10,093					18,903
	Cutover (1920-39)	7,954	54,475	41,080	1,763				97,318
	Reproduction (1910-39)	8,268	107,626	60,169	66	1,030		199	169,090
	Pole	5,915	38,379	22,853	678	568			62,478
	Mature	341	4,163	616					4,779
	Miscellaneous	90	1,088	236					1,324
	Stream	1,576	59,484	9,283	37,909	1,088		1,008	108,772
	All Types	26,202	274,025	144,330	40,416	2,686		1,207	462,664
All Workings	Plantation (1945-49)	201	15,170	31,429	119				46,718
	Cutover (1945-49)	743	54,786	32,033					86,819
	Plantation (1940-44)	2,113	10,427	10,116					20,543
	Cutover (1940-44)	2,369	29,868	350,601	1,014	39			381,522
	Cutover (1920-39)	11,048	115,783	127,553	5,418				248,754
	Reproduction (1910-39)	21,973	375,594	142,527	3,891	12,416	517	199	535,144
	Pole	27,817	641,617	163,278	1,567	7,319	87		813,868
	Mature	871	26,107	5,998					32,105
	Miscellaneous	501	4,753	3,110		335			8,198
	Stream	4,761	438,741	26,513	104,436	68,682	11,496	17,648	667,516
	All Types	72,397	1,712,846	893,158	116,445	88,791	12,100	17,847	2,841,187

TABLE 7

SUMMARY OF RIBES ERADICATION, 1923-1947
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	1,137	1,033	44,914	.91	40	1,137	473
	Cutover	1945-49	743	673	86,819	.91	117	743	17,722
	Burn	1940-44	926	535	100,985	.58	109	926	246
	Plantation	1940-44	5,892	8,232	2,183,197	1.40	371	5,892	227
	Cutover (5)	1940-44	11,484	13,217	5,332,287	1.15	464	11,484	116,007
	Cutover	1920-39	85,664	83,438	24,778,188	.97	289	81,267	241,705
	Reproduction	1910-39	604,409	679,146	183,015,087	1.12	303	593,741	163,020
	Pole		373,134	160,053	28,439,912	.43	76	368,485	85,211
	Mature		708,607	298,853	63,278,180	.42	89	540,616	191,085
	Miscellaneous		36,909	32,485	8,409,040	.88	228	34,204	9,700
	Stream (1)		125,199	315,139	64,884,214	2.52	518	124,219	23,747
	All Types		1,954,347	1,593,352	380,664,573	.82	195	1,762,957	849,143
Second	Plantation	1945-49	53	155	18,411	2.92	347	53	
	Plantation	1940-44	4,507	4,365	254,463	.97	56	4,507	
	Cutover	1940-44	872	818	65,078	.94	75	872	
	Cutover	1920-39	55,656	62,009	13,200,700	1.11	237	55,656	
	Reproduction	1910-39	196,837	234,971	22,384,996	1.19	114	195,120	
	Pole		104,204	56,251	4,878,827	.54	47	103,477	
	Mature		43,624	27,767	2,974,606	.64	68	39,654	
	Miscellaneous		4,767	5,445	886,462	1.14	186	4,767	
	Stream (2)		60,564	93,397	12,413,121	1.54	205	60,173	
	All Types		471,084	485,178	57,076,664	1.03	121	464,279	
Third	Plantation	1940-44	3,024	2,373	83,815	.78	28	3,024	
	Cutover	1920-39	31,825	32,632	1,988,841	1.03	62	31,825	
	Reproduction	1910-39	65,308	89,406	3,525,405	1.37	54	64,701	
	Pole		17,023	10,490	501,541	.62	29	17,023	
	Mature		3,421	2,568	276,997	.75	81	3,421	
	Miscellaneous		1,066	566	32,152	.53	30	1,066	
	Stream (3)		20,228	29,856	2,655,144	1.48	131	20,228	
	All Types		141,895	167,891	9,063,895	1.18	64	141,288	
Total	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	1,190	1,188	63,325	1.00	53	1,190	
	Cutover	1945-49	743	673	86,819	.91	117	743	
	Burn	1940-44	926	535	100,985	.58	109	926	
	Plantation	1940-44	13,423	14,970	2,521,475	1.12	188	13,423	
	Cutover (6)	1940-44	12,356	14,035	5,397,365	1.14	437	12,356	
	Cutover	1920-39	173,145	178,079	39,967,729	1.03	231	168,748	
	Reproduction	1910-39	866,554	1,003,523	208,925,488	1.16	241	853,562	
	Pole		494,361	226,794	33,820,280	.46	68	488,985	
	Mature		755,652	329,188	66,529,783	.44	88	583,691	
	Miscellaneous		42,742	38,496	9,327,654	.90	218	40,037	
	Stream (4)		205,991	438,392	79,952,479	2.13	388	204,620	
	All Types		2,567,326	2,246,421	446,805,132	.88	174	2,368,524	

Chemical work included above:

Stream

	Acres	Man-Days	Gallons Spray
(1)	23,468	55,560	1,538,839
(2)	9,613	13,870	252,435
(3)	4,298	5,426	58,992
(4)	37,379	74,856	1,850,266

Upland

	Acres	Man-Days	Gallons Spray
(5)	61	102	14,700
(6)	61	102	14,700

TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923-1947
INLAND EMPIRE

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	48,984	20,468	5,042,300	79,864	.42	103
	EQ-Coop.	269,937	162,895	24,099,103	222,923	.60	89
	EQ-Emerg.	514,942	404,100	96,874,569	213,935	.78	188
	FS-Reg.	460,198	495,655	84,152,326	474,188	1.08	183
	FS-Emerg.	337,869	216,240	56,636,775	125,491	.64	168
	CCC	590,414	661,693	123,729,240	657,303	1.12	210
	Total	2,222,344	1,961,051	390,534,313	1,773,704	.88	176
Montana	EQ-Reg.	2,002	3,295	761,710	34,795	1.65	380
	EQ-Emerg.	66,076	30,787	5,775,415	1,330	.47	87
	FS-Reg.	41,922	51,616	4,578,794	25,299	1.23	109
	FS-Emerg.	35,712	35,620	7,367,723	21,638	1.00	206
	CCC	14,475	12,440	1,472,009	6,325	.86	102
	Total	160,187	133,758	19,955,651	89,387	.84	125
Washington	EQ-Emerg.	64,757	63,140	17,825,782		.98	275
	FS-Reg.	61,344	49,381	10,988,893	1,875	.80	179
	FS-Emerg.	36,366	14,386	4,013,260		.40	110
	CCC	22,328	24,705	3,487,233		1.11	156
	Total	184,795	151,612	36,315,168	1,875	.82	197
Total	EQ-Reg.	50,986	23,763	5,804,010	114,659	.47	114
	EQ-Coop.	269,937	162,895	24,099,103	222,923	.60	89
	EQ-Emerg.	645,775	498,027	120,475,766	215,265	.77	187
	FS-Reg.	563,464	596,652	99,720,013	501,362	1.06	177
	FS-Emerg.	409,947	266,246	68,017,758	147,129	.65	166
	CCC	627,217	698,838	128,688,482	663,628	1.11	205
	Total	2,567,326	2,246,421	446,805,132	1,864,966	.88	174

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923-1947
INLAND EMPIRE

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	857,488	234,726	61,818	1,154,032	251,827	1,109,315
	Public Domain	16,372	6,172	2,360	24,904	12,682	29,054
	Subtotal Federal	873,860	240,898	64,178	1,178,936	264,509	1,138,369
	State	229,574	63,005	20,145	312,724	118,653	348,227
	Private	409,478	106,505	36,453	552,436	358,590	768,068
	Subtotal Other	639,052	169,510	56,598	865,160	477,243	1,116,295
	Total	1,512,912	410,408	120,776	2,044,096	741,752	2,254,664
Montana	National Forest	117,596	10,328	3,655	131,579	55,660	173,256
	Public Domain	40	3		43		40
	Subtotal Federal	117,636	10,331	3,655	131,622	55,660	173,296
	State	734	1		735	173	907
	Private	18,998	2,590	2,014	23,602	14,852	33,850
	Subtotal Other	19,732	2,591	2,014	24,337	15,025	34,757
	Total	137,368	12,922	5,669	155,959	70,685	208,053
Washington	National Forest	88,940	29,161	10,052	128,153	31,708	120,648
	Public Domain	315	60		375		315
	Subtotal Federal	89,255	29,221	10,052	128,528	31,708	120,963
	State	6,832	4,015	2,114	12,961	988	7,820
	Private	16,590	7,713	2,677	26,980	4,010	20,600
	Subtotal Other	23,422	11,728	4,791	39,941	4,998	28,420
	Total	112,677	40,949	14,843	168,469	36,706	149,383
Total	National Forest	1,064,024	274,215	75,525	1,413,764	339,195	1,403,219
	Public Domain	16,727	6,235	2,360	25,322	12,682	29,409
	Subtotal Federal	1,080,751	280,450	77,885	1,439,086	351,877	1,432,628
	State	237,140	67,021	22,259	326,420	119,814	356,954
	Private	445,066	116,808	41,144	603,018	377,452	822,518
	Subtotal Other	682,206	183,829	63,403	929,438	497,266	1,179,472
	Total	1,762,957	464,279	141,288	2,368,524	849,143	2,612,100

BLISTER RUST CONTROL WORK, CLEARWATER OPERATION, 1947

By
M. C. Riley, Operation Supervisor
H. J. Faulkner, Assistant Operation Supervisor
B. C. Amsbaugh, Forest Officer

INTRODUCTION

The 1947 blister rust control program on the Clearwater operation included five camps operated by the Bureau of Entomology and Plant Quarantine and five camps by the Forest Service. In view of the small program, the work was located as strategically as possible within the 488,000 acre control area.

The workers were slightly older than those employed in the past few years and were a better class of labor. Efforts were made to combat labor turnover by providing additional recreational facilities in camps, intercamp competition and recreational trips. Most of the turnover was among workers from south Idaho and the local towns while the most stable group of workers came from the middle west.

Accomplishments on ribes eradication were cut short by a loss of considerable time because of rainy weather and by an early closing of Bureau camps caused by a reduction in funds.

ORGANIZATION AND ADMINISTRATION

Working agreements with cooperating agencies and the organization of field activities followed the same lines as in previous years. Blister rust control field organization for the 1947 field season was as follows:

Bureau of Entomology and Plant Quarantine	U. S. Forest Service
M. C. Riley, Operation Supervisor	B. C. Amsbaugh, Forest Officer
H. J. Faulkner, Assistant Operation Supervisor	Ray Van Deusen, Unit Supervisor
N. O. Glenisky, Checker Foreman	
G. A. Meyer, Unit Supervisor	

Program	Number Camps	Number Workers	Number Checkers
EQ-Cooperative	5	240	5
FS-Regular	5	195	3
Total	10	435	8

Thirty Mexican Nationals were secured in July for work in Forest Service camps. They were used on specially selected areas in conjunction with regular employees where there were sufficient high caliber workers for supervision and mop-up work. The Mexicans were available later in the season than other employees.

The first camp was established on May 19 and the last camp was occupied on June 15. The Bureau camps were all closed by August 15, while the Mexicans worked until September 26.

Cooperative Camps on State and Private Land

Camp 120, Hildebrand, located in T. 36 N., R. 5 E., sec. 16. This camp was near the state highway on Hildebrand Creek 2½ miles from Pierce, Idaho. First working was performed on 1,224 acres of land cut over in 1937 and second working was done on 294 acres of a 1939 plantation and its protection zone. First working had been delayed on the 1937 cutting area until it was certain that sufficient white pine stocking was present to warrant cost of control.

There was a wide variation in the number of ribes removed from the area, ranging from ten to several hundred, and averaging fifty per acre. Ribes viscosissimum was the predominating species. In addition, 25 acres of stream type on Flat Creek were sprayed with chemicals for the destruction of R. lacustre and R. petiolare. Ammate was applied on most of this area with power equipment. The Mist Makers, applying 2,4-D, were used on side streams where only R. petiolare occurred. Additional work will be necessary where numerous ribes were removed this year and where suppressed bushes and new seedlings occurred. On the areas of lighter ribes population the only future work will be in stream type.

Camp 121, Rhodes Creek, located in T. 36 N., R. 5 E., sec. 1. The area extends down stream from the national forest boundary on both Rhodes Creek and Orofino Creek. First and second workings were involved on areas logged from 1940 to 1944. There were 254 acres of advance pole worked for the third time on the east side of Orofino Creek below the mouth of Rhodes Creek. Numerous ribes were present in the cutover type with R. viscosissimum predominating. Although good work was secured, additional workings will be necessary because the areas have not become stabilized and new seedlings are present. Twelve bushes per acre were removed from the pole type and the check shows an average of one bush with two feet of live stem remaining. No additional work should be necessary in this type except along the main stream. This is the second year this camp has been occupied and it should be used again next season to complete work on Orofino Creek and Mutton Gulch.

Camp 122, Jaype, located at the old Jaype railhead in T. 37 N., R. 5 E., sec. 21. This camp is centrally situated in a large block of white pine and by transporting crews the entire Quartz, Trail, Three Mile, McCauley, and part of the Orofino Creek drainages can be worked from this location. During 1947 second and third workings were performed on areas cut over between 1928 and 1936 on Quartz, Trail, and upper McCauley drainages. First working was performed on 1940 to 1944 cutover area in the north half of sec. 3, T. 36 N., R. 5 E., on main Orofino Creek. Of the 2,609 acres worked by this camp 247 were first working, 48 were second working, and 2,314 were third working. The first working on Orofino Creek supported a heavy ribes population and future workings will be necessary to protect the area. The third working generally supported few ribes. There were 850 acres, averaging less than 10 ribes per acre, which were worked at the rate of 4 acres per man-day using a special crew in open formation. With the exception of some troublesome spots that support small, suppressed ribes in a dense cover of vegetation, this area should require little additional work for permanent protection.

Camp 123, Reeds Creek, located in T. 38 N., R. 5 E., sec. 26, on the main Headquarters highway one-quarter mile south of the Timber Protective Association headquarters. First working was performed on 98 acres, second working on 455 acres, and third working on 897 acres. Heavy ribes populations, averaging from several hundred to thousands per acre, have appeared following logging operations on the Reeds Creek drainage. Several successive workings have been necessary with hand eradication methods to protect these areas and considerable damage to stocking has resulted from blister rust infection. With the recent developments in chemical methods it is hoped that areas logged in the future in this drainage may be protected more economically and successfully. On the new cutting worked for the first time this year there was an average of 340 ribes per acre with portions having over 1,000 per acre. Second working on area cut over in 1941 showed 60 ribes per acre. Third working on area logged prior to 1940 found 17 ribes per acre. Additional coverage will be necessary on areas worked for the first and second times this year. Checking results show that some additional work will also be necessary on portions of the third working area. Due to density of the vegetation many ribes are suppressed and remain so small that crews do not locate them all.

Camp 124, Bush Creek, located in T. 39 N., R. 6 E., sec. 33, in the upper portion of the Scofield Burn. Second working was performed on upland types and chemical eradication in stream type was conducted on Scofield Creek. First working on the Scofield Burn, which comprises 4,500 acres, was done during the years 1934 to 1937. Due to a reduction in the program, second working was delayed until 1944. Ribes petiolare had become re-established in fairly heavy concentrations and numerous ribes were present in the upland by 1941, which was a very favorable year for spread of the rust. As a result severe damage to the stocking of the stand has occurred. Work in 1947 completed the mop-up of stream type and blocked in second working on approximately one-half of the best part of the area. The size of future programs and an evaluation of the damage will determine what future work will be done on the area.

Forest Service Camps on Federal Lands

Camp 181, Musselshell Creek, located in T. 35 N., R. 6 E., sec. 30. Work was performed on the Deer Creek plantation, the cutover land adjacent to it, and on a portion of the area in Gold Creek. The Deer Creek plantation of 48 acres was slashed in the spring and control-burned in the fall of 1946 and planted in the spring of 1947. The cutover area still contains a considerable amount of pole-size white pine. The light working conditions encountered in this type were largely the result of the shade furnished by the pole timber remaining. The work in Gold Creek was in pole type. It is planned to complete work in this drainage in 1948 and very little additional work should be required for adequate protection.

Broadcast power spraying using Ammate was done on a portion of the stream type on Musselshell Creek. It appeared that good results were obtained. If an examination in the spring of 1948 confirms this observation, the balance of stream type will be sprayed in 1948.

Camp 182, Beaver Creek, located in T. 39 N., R. 5 E., sec. 14. This crew worked on the Beaver and Alder Creek plantations and adjacent areas. Rework was conducted on the 1940 Alder Creek plantation and initial work was performed on the

area planted in 1947 in the Alder Creek drainage. In the Beaver Creek drainage, rework was conducted on areas planted in 1937 and 1938 and where fill-in plantings were made in 1947. These plantations now contain very few ribes and little further work should be required to insure protection. Rework was performed in pole and reproduction stands surrounding the plantations. It is planned to continue work in Alder and Beaver Creek drainages until all work areas in the unit are in such condition to insure protection of the existing stands.

Camp 183, Moose Creek, located in T. 40 N., R. 11 E., sec. 32. Initial work and rework were conducted in pole and reproduction stands in the Moose Creek and Independence Creek drainages. Pine infection is heavier here than on a majority of the areas worked this season. It is felt that work is fully justified due to heavy stocking of white pine on the area at the present time and the presence of seedlings appearing throughout the stand in favorable openings. It is possible that some growing time may be lost in establishing a fully-stocked stand but protection of the area is warranted.

Camp 184, Deadwood Creek, located in T. 40 N., R. 11 E., sec. 31. This crew performed initial work in pole and reproduction stands on Deadwood and Moose Creek drainages. The area included some white pine acreage which had heretofore not been included in the control area but was worked to give additional protection strip. The age and density of the stands are such that little additional work is planned to afford adequate protection.

Camp 185, Sheep Mountain Creek, located in T. 40 N., R. 7 E., sec. 31. A crew of 10 men was employed on ribes eradication for 1 month to rework an area planted during the spring. The area adjacent to the plantation is reproducing satisfactorily to white pine and it is scheduled for working in 1948.

METHODS AND EQUIPMENT

Prior to opening camps a 2-day training school was held for the supervisory personnel. In addition to a review of ribes eradication and safety measures, the new training charts were demonstrated and emphasis was placed on reducing man-day costs. Workers were given continual training throughout the season.

An open crew formation on ribes eradication, with each man covering an area approximately one chain wide, was employed where possible. Several modifications in crew size and width of strip were used, depending upon visibility, number of ribes on the area, and type of labor available. Toward the latter part of the season one-man strips were used to good advantage. High caliber men such as crew leaders and straw bosses worked singly in adjoining strips approximately one rod wide. Had more time been available each man would have been assigned an individual block and it is felt that this would have increased both output and efficiency. One-man crews worked a total of 118 acres with results secured being well above those of regular three-man crews. Further application of this method is contemplated for the coming season. Aside from these methods, the conventional three-man handpulling crew was used in upland types. Where the caliber of workers permitted, individual three-man crews worked independently in assigned blocks; otherwise, they were worked in adjoining strips under the supervision of a straw boss or foreman.

In stream type spraying, the Bean-Cutler portable unit was used on one area. Two nozzles were employed either directly from the unit or with the use of main line and laterals. Mist Makers were used to good advantage on both initial and rework areas where only R. petiolare was present. The standard knapsack sprayer was also used. Work was done with the Hardie power unit on three different areas of upland. Two nozzles were used sometimes directly from the power unit but in the majority of cases with main line and laterals. As different types of nozzles were developed they were given practical tests and records were kept as to dosage and man-hours.

For use on roads not passable with a Hardie unit another power unit was developed on the Clearwater operation. This consisted of a two-wheel water trailer of approximately 265 gallon capacity with a Bean-Cutler pump mounted on the frame. In addition, a Pacific Marine pumper for filling the tank was placed on the frame. The trailer was pulled by an International T-9 tractor-dozer. This unit proved practical on the Clearwater operation, where many of the logging roads do not permit the use of regular trucks without considerable road repair work. Any obstruction which interferes with this unit can usually be removed without difficulty.

The following tabulation shows data for the power unit experiments:

Area	Eradication Type	Equipment	Chemical	Acres	Man-Days	Gallons Spray
Washington Creek	Cutover	Hardie	2,4-D	35	76	10,600
Flat Creek	Stream	Trailer	Ammate	16	31	1,227
Mutton Gulch	Cutover	Hardie	2,4-D	15	24	3,400
Summit Lookout	Cutover	Hardie	Ammate	1	2	700

CHECKING

All checking work was performed under the direct supervision of the checking foreman. Five checkers were employed by the Bureau, two of whom were experienced, and the Forest Service employed three checkers including one with previous experience. All worked areas were given a regular check except where the ribes were removed so late in the season that a check would be of little value. The intensity of the check was varied according to areas. Lower per cent checks were run where further work is indicated before a maintenance status can be reached. All necessary advance check was run prior to crew work.

CONTROL STATUS

The status of blister rust control work on the Clearwater National Forest is in a favorable condition. The size of the program for the past season and that contemplated for the coming field seasons appears to be adequate. A work plan has been developed which assures proper timing of work on areas considered for protection; cutting practices are being followed with a view to limiting ribes regeneration as much as possible and future plans regarding planting white pine take into consideration all phases of the blister rust problem.

A more difficult situation exists on the Clearwater Timber Protective Association. Blister rust infection, in varying degrees, occurs generally over the

entire area. Although 1941 was the last year in which a heavy infection wave was observed, there is a steady increase each year in the amount of infection. There are instances on small, unprotected areas where the reproduction that came in after the 1941 wave has been almost entirely lost. Many of the older cuttings have only a small amount of new infection because the control program was large enough to permit proper timing of ribes eradication work. Because of the smaller control program in recent years and the accelerated rate of cutting it is now impossible to perform ribes eradication at the proper time on all cutover areas which are reproducing satisfactorily to white pine. Under the smaller program efforts are being made to perform work on areas of highest priority considering such factors as stocking, cost of protection, accessibility and keeping areas worked in solid blocks representing various age classes. Logging of white pine is progressing at the rate of over 8,000 acres per year. Much of this as mature was classed on maintenance but it now reverts to the unworked cutover category. Very little of the work performed during the current season on Clearwater Protective Association lands can be placed in the maintenance classification because a large portion of the work was done on areas which were logged so recently that they have not yet become stabilized. It is considered that a period of 15 years must elapse after the last disturbance before an area can be classed as on a maintenance basis and observations have shown that some areas require an even longer period to become stabilized. With the amount of cutting taking place and with the smaller work program there is a decreasing amount of area being carried on maintenance each year.

For the entire Clearwater operation there is a total of 89,080 acres on maintenance. As a result of ribes eradication and checking work during the 1947 field season 847 acres were placed on a maintenance basis and 2,047 acres were removed from this category because of logging operations.

STATEMENT OF EXPENDITURES AND COSTS

The following tables show the statement of expenditures by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947
CLEARWATER OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	$ 11,247.56
	Regular BLR-3-4	143,612.56
	Subtotal	154,860.12
State of Idaho Clearwater Timber Protective Association	State BLR-3-4	7,142.36
	Private BLR-3-4	6,422.40
	Subtotal	13,564.76
Forest Service	Regular BLR-4	126,138.88
Total		$294,563.76

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
CLEARWATER OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	Total
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	
Sal. perm. men	$10,837.42	$ 9,999.21		$ 20,836.63	$ 7,521.56	$ 28,358.19
Sal. temp. men		16,180.16	$ 2,636.18	18,816.34	17,384.06	36,200.40
Wages, temp. labs.		43,876.05	10,928.58	54,804.63	63,043.54	117,848.17
Subs. supplies		27,870.63		27,870.63	24,123.17	51,993.80
Equipment		11,203.64		11,203.64	2,216.49	13,420.13
Pur. trucks, cars		14,756.06		14,756.06		14,756.06
Travel & Transp.	307.20	5,224.82		5,532.02	2,771.07	8,303.09
Other Supplies	102.94	14,501.99		14,604.93	9,078.99	23,683.92
Total	$11,247.56	$143,612.56	$13,564.76	$168,424.88	$126,138.88	$294,563.76

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Plantation	1945-49	148	488	28,307	3.30	191
	Cutover (5)	1940-44	1,456	831	268,697	.57	185
	Cutover	1920-39	1,458	1,323	86,839	.91	60
	Reproduction	1910-39	664	765	40,501	1.15	61
	Pole		822	825	34,727	1.00	42
	Stream (1)		19	111	20,020	5.84	1,054
	Total		4,567	4,343	479,091	.95	105
Second	Plantation	1945-49	53	155	18,411	2.92	347
	Cutover	1940-44	440	545	53,763	1.24	122
	Cutover	1920-39	797	737	32,575	.92	41
	Reproduction	1910-39	1,560	2,198	77,812	1.41	50
	Pole		1,227	462	15,573	.38	13
	Total		4,077	4,097	198,134	1.00	49
Third	Plantation	1940-44	60	45	1,116	.75	19
	Cutover	1920-39	3,255	1,502	48,879	.46	15
	Reproduction	1910-39	883	685	13,894	.78	16
	Pole		666	400	12,426	.60	19
	Stream (3)		42	118	60,612	2.81	1,443
	Total		4,906	2,750	136,927	.56	28
All Workings	Plantation	1945-49	201	643	46,718	3.20	232
	Plantation	1940-44	60	45	1,116	.75	19
	Cutover (6)	1940-44	1,896	1,376	322,460	.73	170
	Cutover	1920-39	5,510	3,562	168,293	.65	31
	Reproduction	1910-39	3,107	3,648	132,207	1.17	43
	Pole		2,715	1,687	62,726	.62	23
	Stream (4)		61	229	80,632	3.75	1,322
	Total		13,550	11,190	814,152	.83	60

Chemical work included above:

	Stream				Upland		
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	19	111	1,787	(5)	61	102	14,700
(3)	42	118	5,319	(6)	61	102	14,700
(4)	61	229	7,106				

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
CLEARWATER OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	1,923	2,105	369,346	15,927	1.09	192
		FS-Reg.	2,644	2,238	109,745	560	.85	42
		Total	4,567	4,343	479,091	16,487	.95	105
	Second	EQ-Coop.	1,815	2,162	131,849		1.19	73
		FS-Reg.	2,262	1,935	66,285		.86	29
		Total	4,077	4,097	198,134		1.00	49
	Third	EQ-Coop.	3,496	1,691	54,103	27	.48	15
		FS-Reg.	1,410	1,059	82,824	5,292	.75	59
		Total	4,906	2,750	136,927	5,319	.56	28
	All Workings	EQ-Coop.	7,234	5,958	555,298	15,954	.82	77
		FS-Reg.	6,316	5,232	258,854	5,852	.83	41
		Total	13,550	11,190	814,152	21,806	.83	60

TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
CLEARWATER OPERATION

State	Working	Acres Worked											
		By Forest Service			By Bureau of Entomology and Plant Quarantine				Total				
									Federal	Other			
		National Forest	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total	Total
Idaho	First	2,644		2,644	50	1,087	786	1,923	2,694	1,087	786	1,873	4,567
	Second	2,142	120	2,262		269	1,546	1,815	2,142	269	1,666	1,935	4,077
	Third	1,410		1,410	120	385	2,991	3,496	1,530	385	2,991	3,376	4,906
	Total	6,196	120	6,316	170	1,741	5,323	7,234	6,366	1,741	5,443	7,184	13,550

TABLE 6

RIBES SPECIES ERADICATED, 1947
CLEARWATER OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	
First	Plantation (1945-49)	148	14,616	13,579	112	28,307
	Cutover (1940-44)	1,456	8,821	259,004	872	268,697
	Cutover (1920-39)	1,458	26,090	57,909	2,840	86,839
	Reproduction (1910-39)	664	39,012	427	1,062	40,501
	Pole	822	33,820	46	861	34,727
	Stream	19	3,910	120	15,990	20,020
	All Types	4,567	126,269	331,085	21,737	479,091
Second	Plantation (1945-49)	53	554	17,850	7	18,411
	Cutover (1940-44)	440	4,643	48,978	142	53,763
	Cutover (1920-39)	797	11,238	20,522	815	32,575
	Reproduction (1910-39)	1,560	72,800	2,296	2,716	77,812
	Pole	1,227	11,904	3,641	28	15,573
	All Types	4,077	101,139	93,287	3,708	198,134
Third	Plantation (1940-44)	60	462	654		1,116
	Cutover (1920-39)	3,255	16,455	30,962	1,462	48,879
	Reproduction (1910-39)	883	9,811	4,083		13,894
	Pole	666	7,559	4,398	469	12,426
	Stream	42	26,150		34,462	60,612
	All Types	4,906	60,437	40,097	36,393	136,927
All Workings	Plantation (1945-49)	201	15,170	31,429	119	46,718
	Plantation (1940-44)	60	462	654		1,116
	Cutover (1940-44)	1,896	13,464	307,982	1,014	322,460
	Cutover (1920-39)	5,510	53,783	109,393	5,117	168,293
	Reproduction (1910-39)	3,107	121,623	6,806	3,778	132,207
	Pole	2,715	53,283	8,085	1,358	62,726
	Stream	61	30,060	120	50,452	80,632
	All Types	13,550	287,845	464,469	61,838	814,152

TABLE 7

SUMMARY OF RIBES ERADICATION, 1929-1947
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1945-49	148	488	28,307	3.30	191	148	
	Cutover	1945-49							5,864
	Plantation	1940-44	60	232	134,749	3.87	2,246	60	
	Cutover (5)	1940-44	6,797	9,604	4,718,767	1.41	694	6,797	28,412
	Cutover	1920-39	39,166	40,222	13,653,624	1.03	349	35,343	29,890
	Reproduction	1910-39	71,993	109,096	33,469,252	1.52	465	71,277	3,584
	Pole		31,076	18,314	3,874,014	.59	125	29,767	5,180
	Mature		219,289	99,880	23,422,354	.46	107	162,687	39,728
	Miscellaneous		5,852	3,900	1,700,804	.67	291	5,416	7,819
	Stream (1)		42,372	78,235	14,078,144	1.85	332	42,372	13,656
	Total		416,753	359,971	95,080,015	.86	228	353,867	134,133
Second	Plantation	1945-49	53	155	18,411	2.92	347	53	
	Plantation	1940-44	60	194	15,587	3.23	260	60	
	Cutover	1940-44	520	619	57,971	1.19	111	520	
	Cutover	1920-39	31,055	30,151	8,251,650	.97	266	31,055	
	Reproduction	1910-39	26,092	40,621	3,727,692	1.56	143	26,016	
	Pole		16,448	8,549	1,132,276	.52	69	15,809	
	Mature		16,333	7,983	815,665	.49	50	14,173	
	Miscellaneous		511	573	371,107	1.12	726	511	
	Stream (2)		23,780	26,966	3,329,143	1.13	140	23,780	
	Total		114,852	115,811	17,719,502	1.01	154	111,977	
Third	Plantation	1940-44	60	45	1,116	.75	19	60	
	Cutover	1920-39	15,582	15,213	1,120,606	.98	72	15,582	
	Reproduction	1910-39	7,264	10,025	458,180	1.38	63	7,264	
	Pole		1,843	1,155	26,335	.63	14	1,843	
	Stream (3)		3,370	3,891	396,360	1.15	118	3,370	
	Total		28,119	30,329	2,002,597	1.08	71	28,119	
All Workings	Plantation	1945-49	201	643	46,718	3.20	232	201	
	Plantation	1940-44	180	471	151,452	2.62	841	180	
	Cutover (6)	1940-44	7,317	10,223	4,776,738	1.40	653	7,317	
	Cutover	1920-39	85,803	85,586	23,025,880	1.00	268	81,980	
	Reproduction	1910-39	105,349	159,742	37,655,124	1.52	357	104,557	
	Pole		49,367	28,018	5,032,625	.57	102	47,419	
	Mature		235,622	107,863	24,238,019	.46	103	176,860	
	Miscellaneous		6,363	4,473	2,071,911	.70	326	5,927	
	Stream (4)		69,522	109,092	17,803,647	1.57	256	69,522	
	Total		559,724	506,111	114,802,114	.90	205	493,963	

Chemical work included above:

	Stream				Upland			
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	15,046	31,302	796,395	(5)	61	102	14,700
(2)	5,875	8,142	119,985	(6)	61	102	14,700
(3)	860	1,414	25,114				
(4)	21,781	40,858	941,484				

TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1947
CLEARWATER OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	4,412	5,273	1,129,228	79,864	1.20	256
	EQ-Coop.	56,599	52,116	7,348,706	155,329	.92	130
	EQ-Emerg.	133,970	125,277	30,398,093	136,847	.94	227
	FS-Reg.	121,353	112,195	28,789,422	150,832	.92	237
	FS-Emerg.	55,908	45,382	14,895,022	24,015	.81	266
	CCC	187,482	165,868	32,241,643	408,597	.88	172
	Total	559,724	506,111	114,802,114	955,484	.90	205

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1947
CLEARWATER OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	154,101	53,682	10,258	218,041	46,251	200,352
	Public Domain	3,690	708	52	4,450	340	4,030
	Subtotal Federal	157,791	54,390	10,310	222,491	46,591	204,382
	State	61,212	14,169	1,855	77,236	29,046	90,258
	Private	134,864	43,418	15,954	194,236	58,496	193,360
	Subtotal Other	195,076	57,587	17,809	271,472	87,542	283,618
	Total	353,867	111,977	28,119	493,963	134,133	488,000

BLISTER RUST CONTROL WORK, ST. JOE OPERATION, 1947

By
H. J. Hartman, Operation Supervisor
D. J. Moore, Forester, U. S. Forest Service
W. F. Painter, Assistant Operation Supervisor
R. H. Kliewer, Unit Supervisor

INTRODUCTION

Blister rust control work was continued on the St. Joe operation for the nineteenth consecutive year. The operation comprises 884,925 acres of western white pine type in the St. Joe National Forest and Potlatch Timber Protective Association. During the past 12 years approximately 124,000 acres of western white pine type have been logged. No control measures have been attempted on these cutover areas. Species composition and density of the residual stands has prevented satisfactory re-establishment of white pine on 85 per cent of the area. Logging disturbance caused heavy ribes regeneration and nearly all white pine seedlings are infected with blister rust. The lack of funds, labor, practical spray equipment, and a satisfactory chemical has necessitated deferment of these logged areas. Chemical eradication with power sprayers will be initiated next year on some of the better logged areas.

At the close of the 1947 field season 479,930 acres had been worked initially, 153,127 acres worked the second time, and 58,715 acres three or more times. About 50 per cent of the control area is either on maintenance or in a sufficiently satisfactory status to be brought through to maturity under the present program. The remaining 50 per cent is receiving no protection under the present small-scale control program.

ORGANIZATION AND ADMINISTRATION

Control activities were organized in accordance with agreements between federal, state, and private agencies. Personnel of the Bureau of Entomology and Plant Quarantine provided assistance in the over-all planning, coordination, and technical direction of the program on lands of all ownership. The Bureau administered the state and private cooperative control program, consisting of five camps located within the boundaries of the Potlatch Timber Protective Association. Three of the camps worked state and private land in the Cameron, Oviat, and Long Meadow drainages. Two camps financed entirely with federal funds worked on land of intermingled ownership in the Purdue and Moose Creek drainages. The Forest Service financed and administered the work of nine camps on National Forest lands in the West Fork of Potlatch, West Fork of St. Maries River, Emerald, Charlie, and Ramskull drainages.

The work season averaged 2½ months per camp. All Bureau camps were closed in early August due to a shortage of funds. The labor was mostly high school and college students. The labor supply improved substantially over last year, although skilled workers and supervisory personnel were very scarce. Labor efficiency improved over that of the preceding year, but is still well below prewar levels. An increase in cost of supplies and some wage increases sent cost of control work to a new high.

The blister rust control 1947 field organization was as follows:

Bureau of Entomology and Plant Quarantine	U. S. Forest Service
H. J. Hartman, Operation Supervisor	D. J. Moore, Forest Officer
W. F. Painter, Assistant Operation Supervisor	Clyde Miller, Checker Foreman
R. H. Kliewer, Unit Supervisor	F. A. Moore, Unit Supervisor
R. E. Myers, Agent (Special Duty Assistant)	F. K. Winch, Unit Supervisor

Program	Number Camps	Number Workers	Number Checkers
E.Q. - Cooperative	5	250	7
F.S. - Regular	9	435	7

Total number employed on blister rust control - 699

Field headquarters at Clarkia, Idaho, maintained by the Bureau, was the operating base for all Bureau and some Forest Service activities. The warehousing and supplying of subsistence for Forest Service camps were handled through the Clarkia Ranger Station.

LOCATION AND DESCRIPTION OF AREAS

Drainage	T	R	S	Date Established	Date Closed	Class of Labor	Size
BUREAU - COOPERATIVE CAMPS							
Round Meadow Creek	39N	1E	3	June 9	Aug. 15	Students	50
Butterfield Creek	39N	1E	2	May 22	Aug. 8	Students	50
Cameron Creek	40N	2E	32	June 9	Aug. 1	Students	50
Purdue Creek	41N	1E	18	May 12	Aug. 9	Students	50
Moose Creek	41N	1W	23	May 15	Aug. 15	Students	50
FOREST SERVICE CAMPS							
W. F. Potlatch Creek	41N	1W	1	June 5	Sept. 2	Students	45
Porcupine Creek	42N	1E	31	June 30	Aug. 27	Students	33
Mazie Creek	42N	1E	24	June 11	Sept. 3	Students	45
Bechtel Creek	42N	1E	12	May 14	Aug. 28	Students	45
W. F. Emerald Creek	43N	1E	32	June 18	Aug. 27	Students	45
E. F. Charlie Creek	43N	2W	14	June 16	Sept. 10	Students	45
S. F. Charlie Creek	43N	2W	15	June 11	Aug. 29	Students	45
S. F. Charlie Creek	43N	2W	27	June 25	Aug. 29	Students	45
Ramskull Creek	43N	2W	6	June 10	Sept. 5	Students	45

While blister rust infection on the St. Joe is very critical, there has been no appreciable amount of new pine infection since the very heavy wave in 1941. All control efforts were directed toward the protection of large bodies of well-stocked reproduction and pole stands of western white pine on sites I and II. All camps were engaged in second, third, and fourth workings. Second working averaged 22 ribes and .89 man-days per acre and third working averaged 10 ribes and .77 man-days per acre. The length of time between workings ranged from 5 to 13 years.

METHODS AND EQUIPMENT

A training school was held for blister rust control supervisory personnel. A complete review of ribes eradication, first aid, and safety was presented. Straw bosses and crewmen were trained on the job. Effective use was made of the new training charts.

Ribes eradication crews ranged from one to three men. Crews worked independently in so far as adequate supervision and dependability of crew members permitted. The flanker method of ribes eradication was used in several camps. Ammonium sulfamate and 2,4-D were widely used in ribes decapitation and in spraying stream type ribes.

Blister rust control has become an extremely important element in the timber management plan now being developed on the St. Joe operation by the Forest Service. For this reason timber management working circle and logging boundaries and the blister rust control working unit boundaries have been made to coincide. In addition timber sale policy and marking practices on forest owned lands in the white pine units are now being made with full cognizance of the disease problem.

CHECKING

The checking organization consisted of 1 checker foreman and 14 checkers. The salaries of the checkers were financed jointly by the Forest Service and Bureau. The checker foreman was directly responsible for the training and supervision of the men in the field. The over-all direction of checking was continued by the Bureau. The method of checking areas by working two checkers together along a check strip was continued. This system is especially applicable to areas of low ribes population and provides the additional information needed on such areas in order to properly evaluate the number and distribution of ribes.

The substantial increase of qualified personnel over previous seasons made it possible to inspect not only the 1947 ribes eradication areas but to carry on an expanded post check program for the inspection of areas classified as post check and maintenance. A total of 40,081 acres were inspected, of which 14,825 acres were regular check and 25,256 acres of post check and maintenance.

SURVEYS

A three-man disease survey crew inspected areas on which additional and new data were needed. A summary of the disease survey data is shown in the following table:

PINE DISEASE SURVEY SUMMARY, 1947

Area	Age Class	T	R	Section	Number of Trees				
					Examined	Infected		With Killing Cankers	
						No.	Per Cent	No.	Per Cent
Purdue	11-20	41N	1W	13	253	55	22	47	19
Collins	11-20	41N	1E	6-7	772	98	13	78	10
Nat Brown	11-20	41N	1E	7-8	690	292	42	242	35
Cameron	11-20	40N	2E	31	616	402	65	223	36
Lindley	11-20	40N	2E	22-27	282	139	49	94	33
W. F. Lindley	11-20	40N	2E	21-22-27 28	378	239	63	189	50
Upper Charlie	0-10	43N	2W	21-22-27 28	1,860	259	14	245	13
Emerald	11-20	42N 43N	1E	3-4-5-32 33-34	4,543	1,800	40	615	14
Bechtel	11-20	42N	1E	11-12-13	2,395	839	35	439	18
W. F. St. Maries	21-40	42N	1E	23-24-25 26	1,831	597	33	234	13
Hidden	11-20	42N	1E	22-23-26 27	795	273	34	88	11
Keeler	11-20	42N	1E	26-27-34 35	3,327	937	28	325	10

A five-man pine stocking survey crew, financed from Forest Service funds, inspected 10,250 acres of reproduction and pole. The survey procedure was the same as that in 1946 and the surveys were begun subsequent to the close of the ribes eradication season. Per cent of pine, degree of stocking, site quality, composition and age class were determined. Such data are of great importance in establishing priority for control work among the white pine working units.

CONTROL STATUS

There were 150,840 acres of maintenance as of December 31, 1947. The breakdown by ownership is: federal 69,642, state and private 81,198. All figures will be subject to corrections upon the completion of the working unit summaries and when the logging data for 1947 on worked mature areas become available.

As a result of the 1947 ribes eradication and checking 5,371 acres were placed on maintenance. In addition a total of 5,657 acres previously classified as maintenance was inspected during the summer. The entire acreage was returned to maintenance after spot workings were made within the area.

A total of 2,881 acres of maintenance area was lost due to 1946 logging.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures is shown in the following tables by the cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947
ST. JOE OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	$ 14,827.16
	Regular BLR-3-4	151,809.90
	Subtotal	$166,637.06
State of Idaho Potlatch Timber Protective Association	State BLR-3-4	$ 4,397.74
	Private BLR-3-4	5,420.30
	Subtotal	$ 9,818.04
Forest Service	Regular BLR-4	$216,530.01
Total		$392,985.11

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
ST. JOE OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Sal. perm. men	$13,612.24	$ 10,735.22		$ 24,347.46	$ 19,303.87	$ 43,651.33
Sal. temp. men		13,648.93	$1,614.74	15,263.67	29,275.35	44,539.02
Wages, temp. labs.		48,700.49	8,203.30	56,903.79	106,783.99	163,687.78
Subs. supplies		32,792.85		32,792.85	37,636.87	70,429.72
Equipment		9,920.17		9,920.17	18,078.66	27,998.83
Trucks		14,756.06		14,756.06		14,756.06
Travel and transp.	406.05	5,400.18		5,806.23	4,245.60	10,051.83
Other supplies	808.87	15,856.00		16,664.87	1,205.67	17,870.54
Total	$14,827.16	$151,809.90	$9,818.04	$176,455.10	$216,530.01	$392,985.11

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Reproduction	1910-39	51	101	2,093	1.98	41
	Stream (1)		64	145	8,054	2.27	126
	Total		115	246	10,147	2.14	88
Second	Plantation	1940-44	55	144	1,640	2.62	30
	Cutover	1920-39	582	897	17,935	1.54	31
	Reproduction	1910-39	3,582	3,101	63,588	.87	18
	Pole		1,414	666	25,714	.47	18
	Stream (2)		197	381	20,344	1.93	103
	Total		5,830	5,189	129,221	.89	22
Third	Plantation	1940-44	276	629	5,735	2.28	21
	Cutover	1920-39	4,292	2,026	22,232	.47	5
	Reproduction	1910-39	4,572	4,556	44,218	1.00	10
	Pole		4,139	2,625	37,247	.63	9
	Stream (3)		920	1,126	28,954	1.22	31
	Total		14,199	10,962	138,386	.77	10
All Workings	Plantation	1940-44	331	773	7,375	2.34	22
	Cutover	1920-39	4,874	2,923	40,167	.60	8
	Reproduction	1910-39	8,205	7,758	109,899	.95	13
	Pole		5,553	3,291	62,961	.59	11
	Stream (4)		1,181	1,652	57,352	1.40	49
	Total		20,144	16,397	277,754	.81	14

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	64	145	1,205
(2)	66	97	1,253
(3)	447	365	408
(4)	577	607	2,866

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
ST. JOE OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	20	61	1,245		3.05	62
		FS-Reg.	95	185	8,902	1,205	1.95	94
		Total	115	246	10,147	1,205	2.14	88
	Second	EQ-Coop.	3,566	3,062	65,279		.86	18
		FS-Reg.	2,264	2,127	63,942	1,253	.94	28
		Total	5,830	5,189	129,221	1,253	.89	22
	Third	EQ-Coop.	5,863	3,224	43,863		.55	7
		FS-Reg.	8,336	7,738	94,523	408	.93	11
		Total	14,199	10,962	138,386	408	.77	10
	All Workings	EQ-Coop.	9,449	6,347	110,387		.67	12
		FS-Reg.	10,695	10,050	167,367	2,866	.94	16
		Total	20,144	16,397	277,754	2,866	.81	14

TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
ST. JOE OPERATION

State	Working	Acres Worked															
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total					
												Federal		Other			
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	Total
Idaho	First	82			13	95				20	20	82			33	33	115
	Second	1,621	242	48	353	2,264	1,727		389	1,450	3,566	3,348	242	437	1,803	2,240	5,830
	Third	5,858	510	259	1,709	8,336	2,197	120	745	2,801	5,863	8,055	630	1,004	4,510	5,514	14,199
	Total	7,561	752	307	2,075	10,695	3,924	120	1,134	4,271	9,449	11,485	872	1,441	6,346	7,787	20,144

TABLE 6

RIBES SPECIES ERADICATED, 1947
ST. JOE OPERATION

Working	Eradication Type	Acres	Ribes Species				Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	
First	Reproduction (1910-39)	51	699	1,394			2,093
	Stream	64	8,049	5			8,054
	All Types	115	8,748	1,399			10,147
Second	Plantation (1940-44)	55	1,617	23			1,640
	Cutover (1920-39	582	9,956	7,979			17,935
	Reproduction (1910-39)	3,582	23,180	38,989		1,419	63,588
	Pole	1,414	5,334	20,369		11	25,714
	Stream	197	13,301	7,043			20,344
	All Types	5,830	53,388	74,403		1,430	129,221
Third	Plantation (1940-44)	276	5,275	460			5,735
	Cutover (1920-39)	4,292	13,726	8,205	301		22,232
	Reproduction (1910-39)	4,572	17,335	25,802	51	1,030	44,218
	Pole	4,139	20,536	16,494	209	8	37,247
	Stream	920	18,508	8,398	1,919	129	28,954
	All Types	14,199	75,380	59,359	2,480	1,167	138,386
All Workings	Plantation (1940-44)	331	6,892	483			7,375
	Cutover (1920-39)	4,874	23,682	16,184	301		40,167
	Reproduction (1910-39)	8,205	41,214	66,185	51	2,449	109,899
	Pole	5,553	25,870	36,863	209	19	62,961
	Stream	1,181	39,858	15,446	1,919	129	57,352
	All Types	20,144	137,516	135,161	2,480	2,597	277,754

TABLE 7

SUMMARY OF RIBES ERADICATION, 1929 - 1947
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Cutover	1945-49							4,021
	Plantation	1940-44	2,209	4,763	1,092,843	2.16	495	2,209	
	Cutover	1940-44	308	221	14,730	.72	48	308	34,933
	Cutover	1920-39	16,291	11,381	3,596,739	.70	221	16,291	156,898
	Reproduction	1910-39	217,952	241,287	81,168,769	1.11	372	217,745	104,721
	Pole		86,838	33,082	7,780,055	.38	90	86,750	18,516
	Mature		177,162	68,756	17,998,538	.39	102	118,421	85,906
	Miscellaneous		2,652	2,297	767,429	.87	289	2,652	
	Stream (1)		35,554	97,368	23,381,631	2.74	658	35,554	
	Total		538,966	459,155	135,800,734	.85	252	479,930	404,995
Second	Plantation	1940-44	1,198	1,207	57,827	1.01	48	1,198	
	Cutover	1920-39	7,684	8,519	549,431	1.11	72	7,684	
	Reproduction	1910-39	84,493	100,199	9,212,218	1.19	109	84,493	
	Pole		38,503	22,414	1,344,093	.58	35	38,415	
	Mature		8,965	6,831	821,719	.76	92	8,055	
	Miscellaneous		431	43	2,567	.10	6	431	
	Stream (2)		12,851	27,966	5,214,670	2.18	406	12,851	
	Total		154,125	167,179	17,202,525	1.08	112	153,127	
Third	Plantation	1940-44	518	929	18,214	1.79	35	518	
	Cutover	1920-39	6,052	4,119	77,758	.68	13	6,052	
	Reproduction	1910-39	31,776	51,216	1,043,871	1.61	33	31,776	
	Pole		9,819	5,927	115,572	.60	12	9,819	
	Mature		170	325	38,042	1.91	224	170	
	Stream (3)		10,380	17,126	1,831,190	1.65	176	10,380	
	Total		58,715	79,642	3,124,647	1.36	53	58,715	
All Workings	Plantation	1940-44	3,925	6,899	1,168,884	1.76	298	3,925	
	Cutover	1940-44	308	221	14,730	.72	48	308	
	Cutover	1920-39	30,027	24,019	4,223,928	.80	141	30,027	
	Reproduction	1910-39	334,221	392,702	91,424,858	1.17	274	334,014	
	Pole		135,160	61,423	9,239,720	.45	68	134,984	
	Mature		186,297	75,912	18,858,299	.41	101	126,646	
	Miscellaneous		3,083	2,340	769,996	.76	250	3,083	
	Stream (4)		58,785	142,460	30,427,491	2.42	518	58,785	
	Total		751,806	705,976	156,127,906	.94	208	691,772	

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	7,484	21,878	671,573
(2)	3,327	4,858	113,162
(3)	3,246	3,571	28,570
(4)	14,057	30,307	813,305

TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1947
ST. JOE OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	55,143	48,053	5,021,747	64,944	.87	91
	EQ-Emerg.	234,519	157,898	43,593,387	77,088	.67	186
	FS-Reg.	198,921	229,542	35,289,363	321,091	1.15	177
	FS-Emerg.	70,981	45,138	15,333,106	101,476	.64	216
	CCC	192,242	225,345	56,890,303	248,706	1.17	296
	Total	751,806	705,976	156,127,906	813,305	.94	208

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1947
ST. JOE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	215,281	82,449	32,525	330,255	96,927	312,208
	Public Domain	12,458	5,411	2,308	20,177	12,007	24,465
	Subtotal Federal	227,739	87,860	34,833	350,432	108,934	336,673
	State	57,903	20,040	6,472	84,415	57,166	115,069
	Private	194,288	45,227	17,410	256,925	238,895	433,183
	Subtotal Other	252,191	65,267	23,882	341,340	296,061	548,252
	Total	479,930	153,127	58,715	691,772	404,995	884,925

BLISTER RUST CONTROL WORK, COEUR D'ALENE OPERATION, 1947

By
A. L. Pence, Jr., Operation Supervisor, Bureau of Entomology and Plant Quarantine
C. J. Pederson, Forestry Aid, U. S. Forest Service
D. L. Priebe, Checking Supervisor, U. S. Forest Service

INTRODUCTION

The month of May was warm and dry and ideal for ribes eradication. Advantage could not be taken of this, as all available personnel were engaged in planting. The remainder of the season was interrupted by rain more than normally. Training activities during June were repeatedly postponed. Though the employment peak had been reached by the first of July, only 900 acres had been worked.

Men who had passed their 18th birthday were employed, and a large number of them were experienced. Consequently, the quality of the crews was quite high. As for supervisory personnel, only one experienced foreman was available for the six camps. For this reason, it is felt that some of the crews were not developed to their fullest capacities. A total of 280 men were hired prior to the first of August to keep 235 positions filled. Thereafter men started leaving and no replacements were hired.

The Forest Service was responsible for the administration and operation of all camps, while technical supervision was provided by the Bureau of Entomology and Plant Quarantine.

LOCATION AND DESCRIPTION OF AREAS

1. Lone Cabin Camp, working unit No. 1. This work was located in secs. 10, 11, 12, 13, 14 and 15 of T. 51 N., R. 2 W. This was a third working on areas cut over in 1927. A disease survey in 1945 showed 6.2 per cent infection. Because of the presence of small bushes, only 68 acres have been placed on maintenance. Training commenced on June 3, and work was discontinued on August 11.

2. Hudlow Camp, working unit Nos. 2 and 5. Work was performed in secs. 25 and 26 of T. 52 N., R. 2 W., and secs. 8, 9, 16, and 17 of T. 52 N., R. 1 W. The Solitaire area was logged in 1935, broadcast burned in 1937 and planting was started in the fall of 1937. This timing multiplied the blister rust problem. In an effort to save the planted trees, all of the area has been worked three times and a part of it has received five workings. A 1945 survey showed that 9.3 per cent of the trees had killing cankers on them. It has since increased to an estimated 20 per cent. It will be necessary to work most of this area again. Work was also performed in the pole stand on the West Fork of Hudlow. Training was commenced on June 17 and the camp was closed on September 5.

3. Independence Camp, working unit No. 28. Work was performed in secs. 2 and 3 of T. 52 N., R. 1 E., and sec. 34 of T. 53 N., R. 1 E. This camp was established late in April for planting purposes, and the personnel were trained for blister rust on June 10. Work was discontinued August 12. A 1944 burn was planted this year, and some natural reproduction was filled in with planted trees. Effective control work in 1941 is apparently the reason pine infection has not increased. Most of this area may be considered in a safe condition, but because of the new planting it will be kept under observation for a few years.

4. West Elk Camp, working unit Nos. 34 and 35. Work was performed in secs. 19, 29, 30, 31 and 32 of T. 53 N., R. 3 E., and secs. 13, 14, 15, 22, 23, 24 and 25 of T. 53 N., R. 2 E. A second working was given a 1927 plantation in West Elk drainage. Only 3 per cent of these trees were found to be infected in 1946. Working conditions on this area are quite severe. A 1929 plantation on the East Fork, which showed 6 per cent infection in 1946, was given a first working. Four hundred and forty acres of these plantations are now on maintenance. Training was started on June 11 and work was discontinued on August 29.

5. Jordan Camp, working unit No. 34. Second and third workings were performed in secs. 14, 15, 16, 17, 20, 21, 22 and 23 of T. 53 N., R. 3 E. These areas are 1924, 1925 and 1926 plantations. Early ribes eradication has prevented an infection build-up, and it continues to be very light and scattered. One thousand six hundred acres are now in a maintenance condition. Training was started on June 4 and work was stopped on September 15.

6. Steamboat Camp, working unit No. 43. Work was done in secs. 26, 27, 34 and 35 of T. 51 N., R. 2 E. This was an experimental 10-man unit established to broadcast spray recently logged areas. A Hardie mobile sprayer was used until July 31, and then four Mist Makers were operated until August 28. A solution of 2,4-D was sprayed on 142 acres. Effectiveness of this work will not be known until next year.

WORKING METHODS

Training charts were used for the first time with marked success. Two teams, each composed of a unit supervisor and three trained assistants, gave all crews their first two days of training. This method was particularly successful in teaching the life cycle, ribes identification and crew formations. Camp foremen and unit supervisors had previously attended a 3-day training school.

With the exception of one camp, all men were initially trained to work in a three-man crew. In the Jordan Camp, only two-man crews were trained from the outset. Following the success noted here, the men in other camps were trained to work as two-man crews. In this formation, the crew leader lays the string, which places him in a position to gauge the width of strip. Close supervision was necessary to maintain maximum width of strip. One-man crews were used where ribes and brush conditions were light, and is favored wherever practical. The flanker system was also used extensively on the Jordan and West Elk areas.

A new era was entered when sprays were used for the first time. Ammate, applied from knapsack sprayers, was used on all stream type ribes and 2,4-D was used experimentally on upland ribes in the Steamboat drainage.

CONTRACT WORK

A contract for hand eradication of ribes was let for the first time in the Northwest Region. An area in the head of Straight Creek (working unit No. 24) of 111 acres was selected. This was considered a fairly easy eradication chance, with ribes varying from 150 per acre evenly distributed in Block 1, to 30 per acre in Blocks 2 and 3 with a patchy distribution. No bids were received when the work was first advertised. After giving the project a little more publicity, a bid

of $9.00 per acre was accepted from two straw bosses. Due to technicalities, actual work did not commence until September 3, with October 13 set as the date for completion of contract.

Adverse weather set in, which forced the contractors to hire two helpers in an attempt to complete the work on schedule. Unfavorable weather continued and on October 4 the contractors were relieved of this responsibility. Eighty-one acres had been completed on which seventy-eight man-days had been spent. Final payment was made after 37 acres had been reworked and rechecked. There were 7,110 ribes destroyed or an average of 88 per acre.

It was interesting to note that these men used the same crew methods that were used in supervised work. Had it been possible for them to start work on an earlier date, it is believed their production rate would have been greater. As it was, they netted slightly less than wages, though there was a saving to the government in excess of one thousand dollars.

CHECKING AND SURVEYS

A post check survey was in progress all summer. This resulted in 10,000 acres being covered as tabulated below:

	Miles of Strip
West Elk Creek Area	38.3
Jordan Creek	7.6
Coffee Creek	12.6
Honey Burn	4.7
Llewelling Creek	22.9
Squirrel Creek	6.7
Iron Creek	5.7
Nicholas Burn	14.1
Burnt Cabin Area	8.4
Cathcart Creek	25.3
Phantom Creek	35.4
Hudlow Creek	4.0
Stella Creek	51.7
Riley Creek Area	17.8
Total	255.2

A disease survey was conducted after all other activities had ceased. Bad weather and lack of personnel made it impossible to complete this project. Information on the following areas was obtained:

Area	Miles Strip	Trees Examined	Trees Infected	Per Cent Trees Infected
Cathcart Creek, secs. 6, 7, 18, T. 51 N., R. 1 W.; secs. 1, 12, T. 51 N., R. 2 W.	12.2	4,566	663	14.5
Honey Burn, sec. 36, T. 53 N., R. 2 W.; sec. 32, T. 53N., R. 1 W.; secs. 5, 6, T. 52 N., R. 1 W.	2.2	2,763	24	.9
Nicholas Burn, secs. 1, 2, T. 51 N., R. 2 W.; secs. 35, 36, T. 52 N., R. 2 W.	4.9	4,479	290	6.5
Pine Flats Creek, secs. 29, 30, 31, 32, T. 52 N., R. 4 E.	2.0	219	20	9.1
Loading Creek, secs. 3, 4, 5, T. 50 N., R. 4 E.	6.4	4,908	431	8.8
Lower Lost Creek, secs. 2, 3, 9, 11, T. 50 N., R. 4 E.; secs. 34, 35, T. 51 N., R. 4 E.	7.2	1,815	267	14.7
Tributary Creek, sec. 24, T. 50 N., R. 5 E.; sec. 19, T. 50 N., R. 6 E.	1.9	515	25	4.9
Bloom Peak, secs. 21, 28, T. 51 N., R. 5 E.	1.6	299	76	25.7

CONTROL STATUS

Most of the areas on which work was undertaken this year fell into a medium or light work classification. However, interspersed throughout the larger blocks of easy control opportunities are problem areas ranging in size from 20 to 100 acres. Located just under ridge tops or in the heads of small streams, these areas are usually the most inaccessible. Hand pulling has required excessive man-days in order to accomplish effective work. They are quite often nonproducing, but represent a constant threat to the young plantations below them, some of which are on maintenance. It is hoped future chemical discoveries will help solve this problem.

After next year, virtually all of the extensive plantations on the Magee ranger district may be considered in a safe condition. These represent the largest block of young growth in this status. Work is gradually falling behind on large blocks of natural reproduction located in the Magee and Wallace districts. The program must be enlarged before these can receive their needed attention.

Except for damage occurring along streams, most of the stands in the pole class are in fair condition. Losses will be extended unless cleanup work can be performed on them. It is hoped to allocate one camp to this age class next year in Upper Tepee Creek.

When upland ribes can be effectively eradicated by chemical means, it will not be difficult to keep abreast of current logging operations. Most sales are being made on a partial cut basis, which does not create a control problem initially. Heavy losses are being taken in the older logged areas in the North Fork country, except on those where it has been possible to maintain control schedules.

There are now 95,785 acres on maintenance, which represent a net gain of only 290 acres for 1947.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures is shown in the following tables by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947
COEUR D'ALENE OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	$ 4,198.87
Forest Service	Regular BLR-4	139,647.30
Total		$143,846.17

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
COEUR D'ALENE OPERATION

Item	Bureau of Entomology and Plant Quarantine Regular BLR-1-4	Forest Service Regular BLR-4	Total
Contract work		$ 721.25	$ 721.25
Sal. perm. men	$4,030.57	9,505.70	13,536.27
Sal. temp. men		10,730.15	10,730.15
Wages, temp. labs.		84,071.12	84,071.12
Subs. supplies		25,696.37	25,696.37
Equipment		1,113.03	1,113.03
Travel and Transp.	168.30	2,794.97	2,963.27
Other supplies		5,014.71	5,014.71
Total	$4,198.87	$139,647.30	$143,846.17

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1940-44	142	213	56,800	1.50	400
	Reproduction	1910-39	767	349	9,278	.46	12
	Stream (1)			57	2,030		
	Total		909	619	68,108	.68	75
Second	Reproduction	1910-39	3,644	2,978	82,164	.82	23
	Stream (2)		184	362	14,170	1.97	77
	Total		3,828	3,340	96,334	.87	25
Third	Cutover	1920-39	361	682	26,123	1.89	72
	Reproduction	1910-39	511	770	40,464	1.51	79
	Pole		358	277	8,782	.77	25
	Mature		71	45	1,140	.63	16
	Stream (3)		77	157	5,350	2.04	69
	Total		1,378	1,931	81,859	1.40	59
All Workings	Cutover	1940-44	142	213	56,800	1.50	400
	Cutover	1920-39	361	682	26,123	1.89	72
	Reproduction	1910-39	4,922	4,097	131,906	.83	27
	Pole		358	277	8,782	.77	25
	Mature		71	45	1,140	.63	16
	Stream (4)		261	576	21,550	2.21	83
	Total		6,115	5,890	246,301	.96	40

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)		57	203
(2)	184	362	1,417
(3)	77	157	535
(4)	261	576	2,155

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
COEUR D'ALENE OPERATION

State	Working	Acres Worked By Forest Service		
		National Forest	Private	Total
Idaho	First	909		909
	Second	3,719	109	3,828
	Third	1,378		1,378
	Total	6,006	109	6,115

TABLE 5

RIBES SPECIES ERADICATED, 1947
COEUR D'ALENE OPERATION

Working	Eradication Type	Acres	Ribes Species		Total Ribes
			Ribes lacustre	Ribes viscosissimum	
First	Cutover (1940-44)	142	14,200	42,600	56,800
	Reproduction (1910-39)	767	8,156	1,122	9,278
	Stream		2,030		2,030
	All Types	909	24,386	43,722	68,108
Second	Reproduction (1910-39)	3,644	58,572	23,592	82,164
	Stream	184	14,170		14,170
	All Types	3,828	72,742	23,592	96,334
Third	Cutover (1920-39)	361	24,232	1,891	26,123
	Reproduction (1910-39)	511	31,676	8,788	40,464
	Pole	358	7,689	1,093	8,782
	Mature	71	1,138	2	1,140
	Stream	77	5,350		5,350
	All Types	1,378	70,085	11,774	81,859
All Workings	Cutover (1940-44)	142	14,200	42,600	56,800
	Cutover (1920-39)	361	24,232	1,891	26,123
	Reproduction (1910-39)	4,922	98,404	33,502	131,906
	Pole	358	7,689	1,093	8,782
	Mature	71	1,138	2	1,140
	Stream	261	21,550		21,550
	All Types	6,115	167,213	79,088	246,301

TABLE 6

SUMMARY OF RIBES ERADICATION, 1927 - 1947
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes	Net Acreage Remaining Worked	Net Acreage Remaining Unworked
First	Plantation	1945-49	715	403	9,547	.56	13	715	
	Burn	1940-44	716	351	53,652	.49	75	716	246
	Plantation	1940-44	992	1,920	465,201	1.94	469	992	227
	Cutover	1940-44	317	332	61,865	1.05	195	317	10,451
	Cutover	1920-39	16,420	21,569	5,382,455	1.31	328	16,420	19,189
	Reproduction	1910-39	90,564	139,751	20,726,827	1.54	229	88,741	9,945
	Pole		65,893	31,279	4,482,605	.47	68	65,157	9,538
	Mature		141,096	87,729	13,798,358	.62	98	123,079	7,390
	Miscellaneous		13,333	16,695	2,965,945	1.25	222	12,909	304
	Stream (1)		14,875	57,829	11,824,163	3.89	795	14,767	2,648
	Total		344,921	357,858	59,770,618	1.04	173	323,813	59,938
Second	Plantation	1940-44	618	1,529	130,960	2.47	212	618	
	Cutover	1920-39	9,389	13,368	1,969,695	1.42	210	9,389	
	Reproduction	1910-39	22,042	33,921	2,002,579	1.54	91	21,309	
	Pole		4,841	3,136	487,525	.65	101	4,841	
	Mature		10,182	8,117	813,461	.80	80	9,882	
	Miscellaneous		1,585	2,963	358,052	1.87	226	1,595	
	Stream (2)		7,987	14,649	1,582,972	1.83	198	7,879	
	Total		56,644	77,683	7,345,244	1.37	130	55,503	
Third	Plantation	1940-44	513	919	51,175	1.79	100	513	
	Cutover	1920-39	4,686	8,656	424,841	1.85	91	4,686	
	Reproduction	1910-39	5,004	7,986	310,739	1.60	62	4,397	
	Pole		1,184	1,073	72,865	.91	62	1,184	
	Mature		1,924	1,418	78,521	.74	41	1,924	
	Miscellaneous		61	72	3,569	1.18	59	61	
	Stream (3)		1,714	2,972	147,366	1.73	86	1,714	
	Total		15,086	23,096	1,089,076	1.53	72	14,479	
All Workings	Plantation	1945-49	715	403	9,547	.56	13	715	
	Burn	1940-44	716	351	53,652	.49	75	716	
	Plantation	1940-44	2,123	4,368	647,336	2.06	305	2,123	
	Cutover	1940-44	317	332	61,865	1.05	195	317	
	Cutover	1920-39	30,495	43,593	7,776,991	1.43	255	30,495	
	Reproduction	1910-39	117,610	181,658	23,040,145	1.54	196	114,447	
	Pole		71,918	35,488	5,042,995	.49	70	71,182	
	Mature		153,202	97,264	14,690,340	.63	96	134,885	
	Miscellaneous		14,979	19,730	3,327,566	1.32	222	14,555	
	Stream (4)		24,576	75,450	13,554,501	3.07	552	24,360	
	Total		416,651	458,637	68,204,938	1.10	164	393,795	

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)		57	203
(2)	184	362	1,417
(3)	77	157	535
(4)	261	576	2,155

1927-1947
mw

TABLE 7

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1927-1947
COEUR D'ALENE OPERATION

State	Class	Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Idaho	EQ-Reg.	25,776	8,351	2,846,383	.32	110
	EQ-Emerg.	41,039	35,541	6,589,217	.87	161
	FS-Reg.*	89,854	107,846	15,003,706	1.20	167
	FS-Emerg.	111,711	86,897	17,620,173	.78	158
	CCC	148,271	220,002	26,145,459	1.48	176
	Total	416,651	458,637	68,204,938	1.10	164

*Includes 81 acres, 78 man-days, and 7,110 ribes of contract work.

TABLE 8

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1927-1947
COEUR D' ALENE OPERATION

State	Ownership	Net Acres in Control Area: Acres Worked First	Acres Worked Second	Acres Worked Third	Acres Worked Total	Acres Unworked	Total Acres
Idaho	National Forest	307,669	53,150	14,350	375,169	52,987	360,656
	State	5,427	440	45	5,912	711	6,138
	Private	10,717	1,913	84	12,714	6,240	16,957
	Subtotal Other	16,144	2,353	129	18,626	6,951	23,095
	Total	323,813	55,503	14,479	393,795	59,938	383,751

BLISTER RUST CONTROL WORK, KANIKSU OPERATION, 1947

By
H. A. Brischle, Operation Supervisor
Kermit Miller, Forester, U. S. Forest Service

INTRODUCTION

The Kaniksu operation is composed of approximately 600,000 acres of valuable white pine stands and high priority white pine sites located in Bonner and Boundary Counties in northern Idaho and Pend Oreille County in northeastern Washington. The Forest Service and the Priest Lake Timber Protective Association are the principal administering agencies operating within the boundaries of the control area.

The control program consisted of five camps administered by the Bureau of Entomology and Plant Quarantine and six by the Forest Service. The control work was performed on areas of high priority white pine pole, reproduction, plantations, and areas recently logged. Power spray equipment and chemicals were used to good advantage on ribes eradication for the first time on this operation.

Experienced supervisors were available for all camps. More experienced and older men including many college students were employed as workers. This resulted in a minimum turnover of personnel during the season.

The first ribes eradication was done at Forest Service Camp 453 located near Ione, Washington, on May 7, and Bureau Camp 401 located on Pack River near Samuels, Idaho, on May 12. Shortage of funds necessitated the closing of all Bureau camps by August 20. Forest Service camps were closed by September 15. All areas on which work was started were completed and checked.

During the season a total of 12,545 acres were worked by Bureau crews of which 4,192 were initial and 8,353 were second and third working. Forest Service crews worked a total of 15,913 acres of which 4,301 were initial work and 11,612 second and third working. As a result of the season's work 19,580 acres or 69 per cent was classed on maintenance, 6,406 acres or 22 per cent will require a post check, and 2,472 acres or 9 per cent of the areas worked will require further work to place them on maintenance. The latest compilation shows 167,748 acres or 27 per cent of the control area on maintenance. This is an increase of 4 per cent over last year.

Extensive observations made during the last year indicate there have been no years of heavy pine infection since 1941. The infection appearing on ribes during the late summer was comparatively light.

ORGANIZATION AND ADMINISTRATION

Blister rust control work on the Kaniksu operation was administered in accordance with the cooperative working agreement between the Bureau of Entomology and Plant Quarantine and the Forest Service. Full responsibility for the administration of the regular Forest Service camps came within the jurisdiction of the Forest Service personnel. Technical advice, training assistance, and supervision of the checkers was afforded by the Bureau of Entomology and Plant Quarantine personnel. All phases of the work on state, private, and intermingled federal lands were administered by the Bureau of Entomology and Plant Quarantine personnel.

The organization on the project was as follows:

Bureau of Entomology and Plant Quarantine

H. A. Brischle, Operation Supervisor
L. J. Easley, Unit Supervisor
S. S. Evans, Unit Supervisor
G. M. Houghton, Checking Supervisor

U. S. Forest Service

Kermit Miller, Forest Officer
M. C. Aaberg, Unit Supervisor
N. C. Perring, Unit Supervisor

Program	Number of Camps	Number Workers	Number Checkers
FS-Regular	6	240	6
EQ-Cooperative	5	285	6

METHODS AND EQUIPMENT

Before the camps opened a 2-day training school was held for all supervisory personnel. A complete review of methods, safety, and personnel training was presented and discussed.

Chemical methods of ribes eradication were used for the first time on the operation. A truck-mounted high pressure sprayer was used to good advantage on areas near roads. In the more inaccessible places a two-man portable power pump was carried into the areas. Back pack sprayers were used to advantage where ribes were too scattered for efficient use of power equipment. Ammonium sulfamate was the only chemical used.

Several one-man crews were used to good advantage on areas of light ribes concentrations and good visibility. An able crewman working alone was able to take advantage of variable conditions not possible with two or three men working together and thus to speed up production without lowering the efficiency of the work.

After the camps were closed two Forest Service seasonal employees undertook to do ribes eradication work on two areas of 76 and 88 acres on a competitive bid contract basis at the rates of $6.25 and $6.50 per acre, respectively. The 88 acre area was worked at the rate of .29 man-days per acre. Approximately 11 ribes per acre were removed. The final check showed one ribes with less than one foot of live stem per acre remaining. The 76 acre area was worked at the rate of .41 man-days per acre. Twenty ribes per acre were removed. The final check showed one ribes with three feet of live stem per acre remaining. Four workings were performed by the contractors on portions of both areas before they were approved as meeting contract specifications.

CHECKING

The checking organization was composed of six checkers paid from Forest Service and five from Bureau funds. Included in this number were one senior checker from the Forest Service and one checker foreman from the Bureau.

All current season work was checked. In addition to the regular check, 5,580 acres of post check were completed and classified as 2,620 acres of maintenance and 2,960 acres in need of rework.

Most of the areas were checked by the checker flanker method. All of the ribes found were recorded as on regular check. At least 10 per cent of the ground was covered where this method was employed, and it afforded a means of locating scattered ribes.

DESCRIPTION AND LOCATION OF WORK AREAS

Bureau Camps 401, 402, and 403. Located in the Pack River and Grouse Creek drainages near Samuels, Idaho. Within these drainages are some of northern Idaho's best white pine sites. Work was in high priority white pine pole and reproduction stands that have become established following a succession of burns after logging. Eighty-two per cent of the 7,243 acres worked by the crews in these camps has been classified as on maintenance, 785 acres or 11 per cent will require a post check, and 480 acres or 1 per cent will need a rework.

Bureau Camp 404. Located on the Middle Fork of East River. Work was in stream type and in stands of pole pine which became established on an 1888 clean second burn. The area was first worked in 1937. After a final check, 2,802 acres or 90 per cent of the acres worked were placed on maintenance, 200 acres on post check and 40 acres on rework.

Bureau Camp 405. Located on Ruby Creek, a tributary of the Upper Priest River. All work was in young white pine pole and reproduction stands, except for a small amount in protection zone in mature type along the river. After the final check 2,707 acres were placed on maintenance and 380 acres on post check.

Forest Service Camp 400. Located at Blister Rust Headquarters on Kalispell Bay. This crew worked stream type along Granite Creek and its tributaries to protect adjacent pole and reproduction areas. The final check showed that 365 acres of pole could be placed on maintenance and 331 acres, largely stream type, would require rework at some future time.

Forest Service Camp 451. Located on Bear Paw Creek, a tributary of the Lower West Branch of Priest River. The area is an excellent stand of white pine pole about 60 years old and was first worked in 1934. A post check made last year showed some light patches of ribes scattered through the upland. As a result of this year's ribes eradication work 1,880 acres or 71 per cent of the area was placed on maintenance and 600 acres or 29 per cent on post check.

Forest Service Camp 452. Located on the Upper West Branch near the High Bridge. This work area consisted of white pine pole, reproduction, recent cutover, and major stream type along the Upper West Branch. The final check showed 1,531 acres or 70 per cent of the area on maintenance, 180 acres of cutover on post check, and 495 acres, largely stream type, on rework.

Forest Service Camp 453. Located on the Big Muddy Creek near Ione, Washington. This area is primarily white pine pole with a small amount of reproduction and cutover. All work in this area was initial. After the final check, 2,359 acres

or 78 per cent was placed on maintenance, 460 acres or 15 per cent on post check and 180 acres or 7 per cent on rework.

Forest Service Camp 454. Located on Kalispell Creek. All work was in stream type and on the plantation area. This was the third working over portions of the plantation where ribes have persisted. After the final check, 2,806 acres were placed on post check and 477 acres on rework; 367 acres in the rework class are in the stream type along Kalispell Creek. Since the area was burned in 1939 it will not be placed on maintenance until a lapse of 15 years.

Forest Service Camp 455. Located on Priest River near the Priest River Experimental Forest. This area consisted of white pine pole, reproduction, cutover, and heavy stream type along the river. Ribes were also eradicated along some of the roads and trails on the Experimental Station area. After the final check it was possible to place 1,958 acres on maintenance, 995 acres on post check, and 385 acres on rework.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs is shown in the following tables by cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947
KANIKSU OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	$ 14,479.42
	Regular BLR-3-4	160,179.55
	Subtotal	$174,658.97
State of Idaho Priest Lake Timber Protective Association	State BLR-3-4	$ 3,488.01
	Private BLR-3-4	4,066.54
	Subtotal	$ 7,554.55
Forest Service	Regular BLR-4	$197,904.64
Total		$380,118.16

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
KANIKSU OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Contract ribes erad.					$ 846.39	$ 846.39
Sal. perm. men	$14,156.57	$ 9,685.09		$ 23,841.66	18,450.35	42,292.01
Sal. temp. men		17,941.79	$1,003.87	18,945.66	20,305.70	39,251.36
Wages, temp. labs.		54,438.72	6,550.68	60,989.40	91,569.29	152,558.69
Subs. supplies		32,249.59		32,249.59	40,882.20	73,131.79
Equipment		10,671.90		10,671.90	4,911.28	15,583.18
Trucks		14,756.06		14,756.06		14,756.06
Travel & transp.	297.61	5,507.89		5,805.50	9,213.03	15,018.53
Other supplies	25.24	14,928.51		14,953.75	11,726.40	26,680.15
Total	$14,479.42	$160,179.55	$7,554.55	$182,213.52	$197,904.64	$380,118.16

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
First	Cutover	1945-49	743	673	86,819	.91	117
	Cutover	1940-44	331	156	2,262	.47	7
	Cutover	1920-39	127	84	13,645	.66	107
	Reproduction	1910-39	262	92	11,098	.35	42
	Pole		6,297	2,662	298,991	.42	47
	Mature		202	201	25,067	1.00	124
	Miscellaneous		90	106	3,121	1.18	35
	Stream (1)		441	737	104,808	1.67	238
	Total		8,493	4,711	545,811	.55	64
Second	Cutover	1920-39	130	41	442	.32	3
	Reproduction	1910-39	2,552	993	22,827	.39	89
	Pole		9,932	3,702	272,204	.37	27
	Mature		328	115	2,259	.35	7
	Miscellaneous		321	147	3,753	.46	12
	Stream (2)		1,756	2,495	194,918	1.42	111
	Total		15,019	7,493	496,403	.50	33
Third	Plantation	1940-44	1,722	445	12,052	.26	7
	Cutover	1920-39	46	7	84	.15	2
	Reproduction	1910-39	1,785	953	36,862	.53	21
	Pole		752	98	4,023	.13	5
	Mature		270	35	3,639	.13	13
	Miscellaneous		90	99	1,324	1.10	15
	Stream (3)		281	334	7,546	1.19	27
	Total		4,946	1,971	65,530	.40	13
All Workings	Cutover	1945-49	743	673	86,819	.91	117
	Plantation	1940-44	1,722	445	12,052	.26	7
	Cutover	1940-44	331	156	2,262	.47	7
	Cutover	1920-39	303	132	14,171	.44	47
	Reproduction	1910-39	4,599	2,038	70,787	.44	15
	Pole		16,981	6,462	575,218	.38	34
	Mature		800	351	30,965	.44	39
	Miscellaneous		501	352	8,198	.70	16
	Stream (4)		2,478	3,566	307,272	1.44	124
	Total		28,458	14,175	1,107,744	.50	39

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	86	106	3,675
(2)	5	12	110
(3)	47	15	150
(4)	138	133	3,935

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
KANIKSU OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre Man-Days	Per Acre Ribes
Idaho	First	EQ-Coop.	4,192	2,534	258,495	1,800	.60	62
		FS-Reg.	1,248	655	31,965		.52	26
		Total	5,440	3,189	290,460	1,800	.59	53
	Second	EQ-Coop.	7,631	2,914	290,314		.38	38
		FS-Reg.	4,925	3,306	121,600	110	.67	25
		Total	12,556	6,220	411,914	110	.50	33
	Third	EQ-Coop.	722	401	14,962	150	.56	21
		FS-Reg.	1,090	331	8,203		.30	8
		Total	1,812	732	23,165	150	.40	13
	All Workings	EQ-Coop.	12,545	5,849	563,771	1,950	.47	45
		FS-Reg.	7,263	4,292	161,768	110	.59	22
		Total	19,808	10,141	725,539	2,060	.51	37
Washington	First	FS-Reg.	3,053	1,522	255,351	1,875	.50	84
	Second	FS-Reg.	2,463	1,273	84,489		.52	34
	Third	FS-Reg.	3,134	1,239	42,365		.40	14
	All Workings	FS-Reg.	8,650	4,034	382,205	1,875	.47	44
Total	First	EQ-Coop.	4,192	2,534	258,495	1,800	.60	62
		FS-Reg.	4,301	2,177	287,316	1,875	.51	67
		Total	8,493	4,711	545,811	3,675	.55	64
	Second	EQ-Coop.	7,631	2,914	290,314		.38	38
		FS-Reg.	7,388	4,579	206,089	110	.62	28
		Total	15,019	7,493	496,403	110	.50	33
	Third	EQ-Coop	722	401	14,962	150	.56	21
		FS-Reg.	4,224	1,570	50,568		.37	12
		Total	4,946	1,971	65,530	150	.40	13
	All Workings	EQ-Coop.	12,545	5,849	563,771	1,950	.47	45
		FS-Reg.	15,913	8,326	543,973	1,985	.52	34
		Total	28,458	14,175	1,107,744	3,935	.50	39

TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
KANIKSU OPERATION

State	Working	Acres Worked												
		By Forest Service				By Bureau of Entomology and Plant Quarantine				Total				
										Federal	Other			
		National Forest	State	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total	Total
Idaho	First	1,248			1,248	2,956	511	725	4,192	4,204	511	725	1,236	5,440
	Second	3,301	1,290	334	4,925	3,463	2,888	1,280	7,631	6,764	4,178	1,614	5,792	12,556
	Third	1,090			1,090		45	677	722	1,090	45	677	722	1,812
	Total	5,639	1,290	334	7,263	6,419	3,444	2,682	12,545	12,058	4,734	3,016	7,750	19,808
Washington	First	2,893		160	3,053					2,893		160	160	3,053
	Second	2,169	80	214	2,463					2,169	80	214	294	2,463
	Third	3,024		110	3,134					3,024		110	110	3,134
	Total	8,086	80	484	8,650					8,086	80	484	564	8,650
Total	First	4,141		160	4,301	2,956	511	725	4,192	7,097	511	885	1,396	8,493
	Second	5,470	1,370	548	7,388	3,463	2,888	1,280	7,631	8,933	4,258	1,828	6,086	15,019
	Third	4,114		110	4,224		45	677	722	4,114	45	787	832	4,946
	Total	13,725	1,370	818	15,913	6,419	3,444	2,682	12,545	20,144	4,814	3,500	8,314	28,458

TABLE 6

RIBES SPECIES ERADICATED, 1947
KANIKSU OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes inerme	
First	Cutover (1945-49)	743	54,786	32,033		86,819
	Cutover (1940-44)	331	2,204	19	39	2,262
	Cutover (1920-39)	127	13,645			13,645
	Reproduction (1910-39)	262	669	4,622	5,807	11,098
	Pole	6,297	246,705	48,500	3,786	298,991
	Mature	202	19,697	5,370		25,067
	Miscellaneous	90	1,402	1,719		3,121
	Stream	441	80,490	9,297	15,021	104,808
	All Types	8,493	419,598	101,560	24,653	545,811
Second	Cutover (1920-39)	130	379	63		442
	Reproduction (1910-39)	2,552	14,705	3,962	4,160	22,827
	Pole	9,932	215,157	54,093	2,954	272,204
	Mature	328	2,247	12		2,259
	Miscellaneous	321	2,263	1,155	335	3,753
	Stream	1,756	175,750	445	18,723	194,918
	All Types	15,019	410,501	59,730	26,172	496,403
Third	Plantation (1940-44)	1,722	3,073	8,979		12,052
	Cutover (1920-39)	46	62	22		84
	Reproduction (1910-39)	1,785	17,561	19,301		36,862
	Pole	752	2,595	868	560	4,023
	Mature	270	3,025	614		3,639
	Miscellaneous	90	1,088	236		1,324
	Stream	281	6,533	885	128	7,546
	All Types	4,946	33,937	30,905	688	65,530
All Workings	Cutover (1945-49)	743	54,786	32,033		86,819
	Plantation (1940-44)	1,722	3,073	8,979		12,052
	Cutover (1940-44)	331	2,204	19	39	2,262
	Cutover (1920-39)	303	14,086	85		14,171
	Reproduction (1910-39)	4,599	32,935	27,885	9,967	70,787
	Pole	16,981	464,457	103,461	7,300	575,218
	Mature	800	24,969	5,996		30,965
	Miscellaneous	501	4,753	3,110	335	8,198
	Stream	2,478	262,773	10,627	33,872	307,272
	All Types	28,458	864,036	192,195	51,513	1,107,744

TABLE 7

SUMMARY OF RIBES ERADICATION, 1923 - 1947
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	30	17	1,598	.57	53	30	473
	Cutover	1945-49	743	673	86,819	.91	117	743	7,757
	Burn	1940-44	210	184	47,333	.88	225	210	
	Plantation	1940-44	2,631	1,317	490,404	.50	186	2,631	
	Cutover	1940-44	4,062	3,060	536,925	.75	132	4,062	36,472
	Cutover	1920-39	12,097	8,797	1,857,587	.73	154	11,523	24,456
	Reproduction	1910-39	166,180	119,157	32,766,760	.72	197	159,561	25,533
	Pole		129,756	45,706	6,351,703	.35	49	128,441	24,067
	Mature		142,700	30,822	5,824,169	.22	41	110,405	39,370
	Miscellaneous		7,387	5,011	1,995,603	.68	270	6,024	1,277
	Stream (1)		22,923	50,270	9,387,166	2.19	410	22,279	6,893
	Total		488,962	265,562	59,457,817	.54	122	446,152	166,298
Second	Plantation	1940-44	2,631	1,435	50,089	.55	19	2,631	
	Cutover	1940-44	352	199	7,107	.57	20	352	
	Cutover	1920-39	6,768	8,879	1,760,274	1.31	260	6,768	
	Reproduction	1910-39	53,014	44,982	5,653,761	.85	107	52,106	
	Pole		37,656	15,966	1,121,811	.42	30	37,656	
	Mature		7,287	4,019	360,005	.55	49	7,287	
	Miscellaneous		1,377	656	47,147	.48	34	1,377	
	Stream (2)		11,593	15,611	1,471,443	1.35	127	11,538	
	Total		120,678	91,747	10,471,637	.76	87	119,715	
Third	Plantation	1940-44	1,933	480	13,310	.25	7	1,933	
	Cutover	1920-39	5,319	4,431	299,643	.83	56	5,319	
	Reproduction	1910-39	17,194	15,950	1,195,800	.93	70	17,194	
	Pole		2,101	580	57,053	.28	27	2,101	
	Mature		1,170	642	105,910	.55	91	1,170	
	Miscellaneous		637	288	5,587	.45	9	637	
	Stream (3)		1,463	1,874	75,680	1.28	52	1,463	
	Total		29,817	24,245	1,752,983	.81	59	29,817	
All Workings	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	30	17	1,598	.57	53	30	
	Cutover	1945-49	743	673	86,819	.91	117	743	
	Burn	1940-44	210	184	47,333	.88	225	210	
	Plantation	1940-44	7,195	3,232	553,803	.45	77	7,195	
	Cutover	1940-44	4,414	3,259	544,032	.74	123	4,414	
	Cutover	1920-39	24,184	22,107	3,917,504	.91	162	23,610	
	Reproduction	1910-39	236,388	180,089	39,616,321	.76	168	228,861	
	Pole		169,513	62,252	7,530,567	.37	44	168,198	
	Mature		151,157	35,483	6,290,084	.23	42	118,862	
	Miscellaneous		9,401	5,955	2,048,337	.63	218	8,038	
	Stream (4)		35,979	67,755	10,934,289	1.88	304	35,280	
	Total		639,457	381,554	71,682,437	.60	112	595,684	

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	86	106	3,675
(2)	5	12	110
(3)	47	15	150
(4)	138	133	3,935

TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923 - 1947
KANIKSU OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	18,796	6,844	1,066,689		.36	57
	EQ-Coop.	158,195	62,726	11,728,650	1,950	.40	74
	EQ-Emerg.	99,041	68,851	11,333,497		.70	114
	FS-Reg.	50,070	46,072	5,069,835	110	.92	101
	FS-Emerg.	99,269	38,823	8,788,474		.39	89
	CCC	62,419	50,478	8,451,835		.81	135
	Total	487,790	273,794	46,438,980	2,060	.56	95
Washington	EQ-Emerg.	31,629	19,288	6,754,071		.61	214
	FS-Reg.	61,344	49,381	10,988,893	1,875	.80	179
	FS-Emerg.	36,366	14,386	4,013,260		.40	110
	CCC	22,328	24,705	3,487,233		1.11	156
	Total	151,667	107,760	25,243,457	1,875	.71	166
Total	EQ-Reg.	18,796	6,844	1,066,689		.36	57
	EQ-Coop.	158,195	62,726	11,728,650	1,950	.40	74
	EQ-Emerg.	130,670	88,139	18,087,568		.67	138
	FS-Reg.	111,414	95,453	16,058,728	1,985	.86	144
	FS-Emerg.	135,635	53,209	12,801,734		.39	94
	CCC	84,747	75,183	11,939,068		.89	141
	Total	639,457	381,554	71,682,437	3,935	.60	112

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923 - 1947
KANIKSU OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	180,127	45,445	4,685	230,257	55,582	235,709
	Public Domain	54			54	80	134
	Subtotal Federal	180,181	45,445	4,685	230,311	55,662	235,843
	State	103,774	27,740	11,773	143,287	31,263	135,037
	Private	66,065	15,525	3,005	84,595	44,022	110,087
	Subtotal Other	169,839	43,265	14,778	227,882	75,285	245,124
	Total	350,020	88,710	19,463	458,193	130,947	480,967
Washington	National Forest	88,940	29,161	10,052	128,153	31,708	120,648
	State	2,080	80		2,160		2,080
	Private	5,112	1,764	302	7,178	3,643	8,755
	Subtotal Other	7,192	1,844	302	9,338	3,643	10,835
	Total	96,132	31,005	10,354	137,491	35,351	131,483
Total	National Forest	269,067	74,606	14,737	358,410	87,290	356,357
	Public Domain	54			54	80	134
	Subtotal Federal	269,121	74,606	14,737	358,464	87,370	356,491
	State	105,854	27,820	11,773	145,447	31,263	137,117
	Private	71,177	17,289	3,307	91,773	47,665	118,842
	Subtotal Other	177,031	45,109	15,080	237,220	78,928	255,959
	Total	446,152	119,715	29,817	595,684	166,298	612,450

BLISTER RUST CONTROL WORK, MONTANA OPERATION, 1947

By
A. S. Skoglund, Operation Supervisor
R. E. Frey, Forester, Cabinet National Forest
M. D. Oaks, Forester, Kootenai National Forest

INTRODUCTION

Blister rust control was conducted on the Cabinet and Kootenai National Forests of the Montana operation. A total of 4,130 acres was worked in 1947 which brings the net progress to 137,368 acres initially worked and 18,591 acres reworked. Approximately 70,685 acres remain to be initially worked.

In most cases a higher type of labor was employed than in the past several years. The many college students recruited from all over the country helped to advance the standards of crew work.

In the Kootenai Forest during the month of August the personnel was engaged chiefly in fire control work.

ORGANIZATION AND ADMINISTRATION

The Forest Service was responsible for the administration and maintenance of the camps and technical supervision was provided by the Bureau of Entomology and Plant Quarantine. The field organization was as follows:

Bureau of Entomology and Plant Quarantine

A. S. Skoglund, Operation Supervisor

U. S. Forest Service

Cabinet Forest

N. D. Fullerton, Forest Officer
R. E. Frey, Forest Officer
C. W. Gustafson, Forest Officer

Kootenai Forest

H. E. Ahlskog, Forest Officer
M. D. Oaks, Forest Officer

Two camps were operated in the Cabinet Forest with a peak of 90 employees. The first camp was established at Rainy Creek on May 21 and closed September 12. The second camp was located on upper Big Creek from June 16 to August 29.

Three camps were operated in the Kootenai Forest with a peak of 100 employees. The first camp was established on Grizzly Creek on June 2. The second camp was located on upper Burnt Creek on June 6. The third camp was established at Sylvanite Ranger Station on June 17. All camps closed during the latter part of August.

LOCATION AND DESCRIPTION OF AREAS

In the Cabinet Forest all work was performed in the St. Regis River drainage. The work in Rainy Creek was an extension of that started in 1945 and continued in 1946. Five species of ribes in varying amounts were encountered in this

area. This area was burned in 1910, logged thereafter, and planted in 1915. It is a very good site for the growth of white pine.

Rework was accomplished in the upper Big Creek basin on lands burned over in 1910. Working conditions were relatively heavy due to considerable brush.

Periodic maintenance work was performed in early spring around Savenac Nursery. Only one to two ribes per acre were found and were usually the result of germination of seed washed in during flood periods.

Work in the Kootenai Forest was performed in the vicinity of Sylvanite Ranger Station. First working was completed on the pole stands in Burnt Creek. In this stand 45-year-old trees measured 15 inches d.b.h. Spray work with ammonium sulfamate was performed on the heavy Ribes inerme patches on the Yaak River. Also rework was done on the stream type areas worked in 1935.

A small amount of rework was performed in the stream type and stream zones on Cyclone Creek. This area consists of a very thrifty stand of 50-year-old pole white pine.

METHODS AND EQUIPMENT

Special emphasis was placed on training in order to bring the workers into production as soon as possible.

Extensive use of chemicals was a high light in 1947 operations. In hand pulling work all troublesome ribes were decapitated and treated with Ammate or 2,4-D, depending on species and location of plant. Each crew in addition to regular ribes picks, carried a supply of Ammate, pruning shears and a bottle of 2,4-D with a brush applicator.

Several types of equipment were used to apply chemical in liquid form. A Hardie orchard sprayer mounted on a 1½-ton chassis was used to spray heavy concentrations of ribes on the streams adjacent to roads. A portable power sprayer was used in places impossible to reach by truck. A back pack-type mist maker was used with a concentrated 2,4-D liquid to treat R. petiolare. In the back country, Ammate was applied to R. lacustre with the regular knapsack sprayer.

CONTROL STATUS

In the Cabinet Forest a total of 42,442 acres is now on a maintenance basis. This represents about 53 per cent of the worked area. Only 363 acres were added as a result of this season's work.

Another 11,000 acres or about 14 per cent are classified as being on post check. In the stream type adjacent to Savenac Nursery, a total of 225 acres containing less than two ribes per acre was worked at the rate of seven acres per man-day. This acreage is being carried in a post check category, as stream type is considered a permanent ribes site. In the St. Regis River drainage, several areas on maintenance were examined and in all cases the classification was correct.

In Savenac Nursery an examination of 10,000 seedlings failed to disclose any blister rust. No rust was found in an examination of 8,500 specimens of 2-1 transplant stock. In the old part of the nursery, less than .1 per cent infection was found on 13,500 specimens of 2-3 transplant stock. Similar findings in the past three years indicate that the most important source of the serious infection in the nursery during 1940-1943 was eliminated with the eradication of ribes under Haugan Lookout. A post check on the lookout area shows less than 25 feet of ribes live stem per acre remaining after working in 1942 and 1945.

In Rainy Creek a high percentage of pine infection is present as a result of the delay in completing the work. A small amount of initial work still remains. The area contains a good stocking of white pine on an excellent site but the progress of the rust during the next few years will largely determine how much volume will be left at maturity.

An advance survey was run on White Pine Creek in anticipation of initial work being performed next year. The area contains some thrifty plantings on a double burn. It should be worked at a nominal cost as the ribes are very light over most of the area. Only a few cankers were found and these were located near the junction of two large streams.

A post check on the south fork of Marten Creek substantiated an older regular check in showing ribes only on the south-facing slopes of the side draws. Pine infection, of 1941 origin, is relatively light and is confined mainly to the area along the main stream.

On the west fork of Marten Creek some damage from armillaria was observed in the young white pine.

In the Kootenai Forest there are nearly 10,000 acres of cutover with a good portion in need of initial work.

Barron Creek was logged in 1943 leaving a residual of young reproduction and pole for the next cut. Few upland ribes are noted on the area and these are confined largely to skid trails and landings. However, numerous ribes are found along the stream and these should be sprayed next season to prevent reseeding.

Keeler Creek was cut over in 1941 to 1947. In the lower portion of the drainage, considerable restocking has taken place. This portion of the area should be initially worked next season to prevent any rust build-up in the area. Stand improvement work is now being performed on some portions of the drainage but control work on these areas should be deferred for several years.

An examination of the pine on the south fork of Callahan Creek discloses some infection along the stream type. Rework should be performed on this area and initial work extended up the right-hand fork.

A total of 32,111 acres is now on a maintenance basis in the Kootenai Forest. The sum of 1,801 acres or 61 per cent of area worked this year was added as a result of 1947 work.

A large portion of this season's maintenance area was contained within the Burnt Creek drainage. However, some of the work done in Grizzly branch was not up to standard, consequently rust conditions should be carefully watched. A light respray next season of the main Burnt Creek stream type should suppress all new seedlings and resprouts for a considerable time.

The work performed this season on Cyclone Creek should be adequate for the protection of this stand. A few old cankers were observed but no recent ones were found. This pole stand is closing in rapidly to preclude the establishment of new ribes.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs by cooperative agency and type of appropriation is shown in the following tabulations:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947
MONTANA OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	$ 2,600.61
Cabinet National Forest	Regular BLR-4	58,888.00
Kootenai National Forest	Regular BLR-4	82,702.53
Total		$144,191.14

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
MONTANA OPERATION

Item	Bureau of Entomology and Plant Quarantine Regular BLR-1-4	Cabinet National Forest Regular BLR-4	Kootenai National Forest Regular BLR-4	Total
Salaries & wages	$2,280.19	$40,243.00	$59,647.29	$102,170.48
Subs. supplies		13,208.00	10,172.65	23,380.65
Equipment		3,165.00	1,753.62	4,918.62
Travel & transp.	320.42	924.00	3,895.77	5,140.19
Other supplies		1,348.00	7,233.20	8,581.20
Total	$2,600.61	$58,888.00	$82,702.53	$144,191.14

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
MONTANA OPERATION

Forest	Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
							Man-Days	Ribes
Cabinet	First	Reproduction	1910-39	78	47	1,067	.60	14
		Stream (1)			15	24,000		
		Total		78	62	25,067	.79	321
	Second	Reproduction	1910-39	326	1,035	41,528	3.17	127
		Stream (2)		24	108	72,061	4.50	3,003
		Total		350	1,143	113,589	3.27	325
	Third and Other	Reproduction	1910-39	517	1,158	33,652	2.24	65
		Stream (3)		256	80	6,310	.31	25
		Total		773	1,238	39,962	1.60	52
	All Workings	Reproduction	1910-39	921	2,240	76,247	2.43	83
		Stream (4)		280	203	102,371	.73	366
		Total		1,201	2,443	178,618	2.03	149
Kootenai	First	Reproduction	1910-39	219	346	14,098	1.58	64
		Pole		2,124	1,232	102,952	.58	48
		Stream (5)		217	560	85,881	2.58	396
		Total		2,560	2,138	202,931	.84	79
	Second	Pole		86	44	1,229	.51	14
		Stream		283	298	12,458	1.05	44
		Total		369	342	13,687	.93	37
	All Workings	Reproduction	1910-39	219	346	14,098	1.58	64
		Pole		2,210	1,276	104,181	.58	47
		Stream		500	858	98,339	1.72	197
		Total		2,929	2,480	216,618	.85	74
All Forests	First	Reproduction	1910-39	297	393	15,165	1.32	51
		Pole		2,124	1,232	102,952	.58	48
		Stream (6)		217	575	109,881	2.65	506
		Total		2,638	2,200	227,998	.83	86
	Second	Reproduction	1910-39	326	1,035	41,528	3.17	127
		Pole		86	44	1,229	.51	14
		Stream (2)		307	406	84,519	1.32	275
		Total		719	1,485	127,276	2.07	177
	Third and Other	Reproduction	1910-39	517	1,158	33,652	2.24	65
		Stream (3)		256	80	6,310	.31	25
		Total		773	1,238	39,962	1.60	52
	All Workings	Reproduction	1910-39	1,140	2,586	90,345	2.27	79
		Pole		2,210	1,276	104,181	.58	47
		Stream (7)		780	1,061	200,710	1.36	257
		Total		4,130	4,923	395,236	1.19	96

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	5	15	2,400
(2)	40	108	6,340
(3)	31	46	443
(4)	76	169	9,183
(5)	130	218	5,913
(6)	135	233	8,313
(7)	206	387	15,096

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
MONTANA OPERATION

Forest	Working	Acres Worked By Forest Service			
		National Forest	Public Domain	Private	Total
Cabinet	First	75		3	78
	Second	301	3	46	350
	Third	599		174	773
	Total	975	3	223	1,201
Kootenai	First	2,560			2,560
	Second	199		170	369
	Total	2,759		170	2,929
All Forests	First	2,635		3	2,638
	Second	500	3	216	719
	Third	599		174	773
	Total	3,734	3	393	4,130

TABLE 5

RIBES SPECIES ERADICATED, 1947
MONTANA OPERATION

Forest	Working	Eradication Type	Acres	Ribes Species						Total Ribes
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Ribes triste	
Cabinet	First	Reproduction (1910-39)	78	956	111					1,067
		Stream (1)		4,000	200	12,000	4,000		3,800	24,000
		All Types	78	4,956	311	12,000	4,000		3,800	25,067
	Second	Reproduction (1910-39)	326	39,510	1,971	47				41,528
		Stream (2)	24	10,249	22	38,537	10,413		12,840	72,061
		All Types	350	49,759	1,993	38,584	10,413		12,840	113,589
	Third and Other	Reproduction (1910-39)	517	31,243	2,195	15			199	33,652
		Stream (3)	256	2,943		1,528	831		1,008	6,310
		All Types	773	34,186	2,195	1,543	831		1,207	39,962
	All Workings	Reproduction (1910-39)	921	71,709	4,277	62			199	76,247
		Stream (4)	280	17,192	222	52,065	15,244		17,648	102,371
		All Types	1,201	88,901	4,499	52,127	15,244		17,847	178,618
Kootenai	First	Reproduction (1910-39)	219	9,709	3,872			517		14,098
		Pole	2,124	89,262	13,603			87		102,952
		Stream (5)	217	55,433	83		19,022	11,343		85,881
		All Types	2,560	154,404	17,558		19,022	11,947		202,931
	Second	Pole	86	1,056	173					1,229
		Stream	283	11,875	15		415	153		12,458
		All Types	369	12,931	188		415	153		13,687
	All Workings	Reproduction (1910-39)	219	9,709	3,872			517		14,098
		Pole	2,210	90,318	13,776			87		104,181
		Stream	500	67,308	98		19,437	11,496		98,339
		All Types	2,929	167,335	17,746		19,437	12,100		216,618
All Forests	First	Reproduction (1910-39)	297	10,665	3,983			517		15,165
		Pole	2,124	89,262	13,603			87		102,952
		Stream (6)	217	59,433	283	12,000	23,022	11,343	3,800	109,881
		All Types	2,638	159,360	17,869	12,000	23,022	11,947	3,800	227,998
	Second	Reproduction (1910-39)	326	39,510	1,971	47				41,528
		Pole	86	1,056	173					1,229
		Stream (2)	307	22,124	37	38,537	10,828	153	12,840	84,519
		All Types	719	62,690	2,181	38,584	10,828	153	12,840	127,276
	Third and Other	Reproduction (1910-39)	517	31,243	2,195	15			199	33,652
		Stream (3)	256	2,943		1,528	831		1,008	6,310
		All Types	773	34,186	2,195	1,543	831		1,207	39,962
	All Workings	Reproduction (1910-39)	1,140	81,418	8,149	62		517	199	90,345
		Pole	2,210	90,318	13,776			87		104,181
		Stream (7)	780	84,500	320	52,065	34,681	11,496	17,648	200,710
		All Types	4,130	256,236	22,245	52,127	34,681	12,100	17,847	395,236

Chemical work included above:

	Acres	Man-Days	Gallons Spray		
			Ammate	2,4-D	Atlacide
(1)	5	15		800	1,600
(2)	40	108	3,075	3,265	
(3)	31	46	355	88	
(4)	76	169	3,430	4,153	1,600
(5)	130	218	5,913		
(6)	135	233	5,913	800	1,600
(7)	206	387	9,343	4,153	1,600

TABLE 6

SUMMARY OF RIBES ERADICATION, 1928-1947
MONTANA OPERATION

Forest	Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes	Net Acreage Remaining Worked	Net Acreage Remaining Unworked
Cabinet	First	Reproduction	1910-39	35,509	36,850	6,421,918	1.04	181	34,940	6,136
		Pole		25,959	9,213	1,745,885	.35	67	25,670	7,134
		Mature		9,377	4,457	1,064,702	.48	114	9,357	1,712
		Miscellaneous		4,900	2,230	596,499	.46	122	4,657	
		Stream (1)		5,039	16,113	3,650,108	3.20	724	5,039	
		Total		80,784	68,863	13,479,112	.85	167	79,663	14,982
	Second	Reproduction	1910-39	5,968	9,625	844,355	1.61	141	5,968	
		Pole		1,108	1,423	101,767	1.28	92	1,108	
		Mature		28	27	1,799	.96	64	28	
		Miscellaneous		33	34	1,503	1.03	46	33	
		Stream (2)		3,018	5,521	634,459	1.83	210	3,018	
		Total		10,155	16,630	1,583,883	1.64	156	10,155	
	Third and Other	Reproduction	1910-39	2,139	2,534	124,201	1.18	58	2,139	
		Pole		125	149	7,256	1.19	58	125	
		Stream (3)		3,250	3,922	193,635	1.21	60	3,250	
		Total		5,514	6,605	325,092	1.20	59	5,514	
	All Workings	Reproduction	1910-39	43,616	49,009	7,390,474	1.12	169	43,047	
		Pole		27,192	10,785	1,854,908	.40	68	26,903	
		Mature		9,405	4,484	1,066,501	.48	113	9,385	
		Miscellaneous		4,933	2,264	598,002	.46	121	4,690	
		Stream (4)		11,307	25,556	4,478,202	2.26	396	11,307	
		Total		96,453	92,098	15,388,087	.95	160	95,332	
Kootenai	First	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1945-49							80
		Cutover	1940-44							5,739
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	3,761
		Reproduction	1910-39	13,803	9,193	1,095,289	.67	79	13,069	9,718
		Pole		23,926	10,721	1,031,320	.45	43	23,014	19,876
		Mature		17,172	4,377	594,415	.25	35	16,167	16,529
		Miscellaneous		346	95	7,956	.27	23	346	
		Stream (5)		3,929	12,362	1,572,080	3.15	400	3,701	
		Total		60,584	37,632	4,357,459	.62	72	57,705	55,703
	Second	Reproduction	1910-39	716	367	30,680	.51	43	716	
		Pole		1,229	1,162	56,347	.95	46	1,229	
		Stream		1,050	2,209	111,980	2.10	107	822	
		Total		2,995	3,738	199,007	1.25	66	2,767	
	Third and Other	Pole		133	276	10,360	2.08	78	133	
		Stream		22	14	738	.64	34	22	
		Total		155	290	11,098	1.87	72	155	
	All Workings	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	
		Reproduction	1910-39	14,519	9,560	1,125,969	.66	78	13,785	
		Pole		25,288	12,159	1,098,027	.48	43	24,376	
		Mature		17,172	4,377	594,415	.25	35	16,167	
		Miscellaneous		346	95	7,956	.27	23	346	
		Stream (5)		5,001	14,585	1,684,798	2.92	337	4,545	
		Total		63,734	41,660	4,567,564	.65	72	60,627	
All Forests	First	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1945-49							80
		Cutover	1940-44							5,739
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	3,761
		Reproduction	1910-39	49,312	46,043	7,517,207	.93	152	48,009	15,854
		Pole		49,885	19,934	2,777,205	.40	56	48,684	27,010
		Mature		26,549	8,834	1,659,117	.33	62	25,524	18,241
		Miscellaneous		5,246	2,325	604,455	.44	115	5,003	
		Stream (6)		8,968	28,475	5,222,188	3.18	582	8,740	
		Total		141,368	106,495	17,836,571	.75	126	137,368	70,685
	Second	Reproduction	1910-39	6,684	9,992	875,035	1.49	131	6,684	
		Pole		2,337	2,585	158,114	1.11	68	2,337	
		Mature		28	27	1,799	.96	64	28	
		Miscellaneous		33	34	1,503	1.03	46	33	
		Stream (2)		4,068	7,730	746,439	1.90	183	3,840	
		Total		13,150	20,368	1,782,890	1.55	136	12,922	
	Third and Other	Reproduction	1910-39	2,139	2,534	124,201	1.18	58	2,139	
		Pole		258	425	17,616	1.65	68	258	
		Stream (3)		3,272	3,936	194,373	1.20	59	3,272	
		Total		5,669	6,895	336,190	1.22	59	5,669	
	All Workings	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	
		Reproduction	1910-39	58,135	58,569	8,516,443	1.01	146	56,832	
		Pole		52,480	22,944	2,952,935	.44	56	51,279	
		Mature		26,577	8,861	1,660,916	.33	62	25,552	
		Miscellaneous		5,279	2,359	605,958	.45	115	5,036	
		Stream (7)		16,308	40,141	6,163,000	2.46	378	15,852	
		Total		160,187	133,758	19,955,651	.84	125	155,959	

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	722	1,999	61,090
(2)	222	496	17,761
(3)	68	269	4,623
(4)	1,012	2,764	83,474
(5)	130	218	5,913
(6)	852	2,217	67,003
(7)	1,142	2,982	89,387

TABLE 7

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1928-1947
MONTANA OPERATION

Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
EQ-Reg.	2,002	3,295	761,710	34,795	1.65	380
EQ-Emergency	66,076	30,787	5,775,415	1,330	.47	87
FS-Reg.	41,922	51,616	4,578,794	25,299	1.23	109
FS-Emergency	35,712	35,620	7,367,723	21,638	1.00	206
CCC	14,475	12,440	1,472,009	6,325	.86	102
Total	160,187	133,758	19,955,651	89,387	.84	125

TABLE 8

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1928-1947
MONTANA OPERATION

Forest	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Cabinet	National Forest	63,051	8,102	3,500	74,653	10,975	74,026
	Public Domain	40	3		43		40
	Subtotal Federal	63,091	8,105	3,500	74,696	10,975	74,066
	State	734	1		735		734
	Private	15,838	2,049	2,014	19,901	4,007	19,845
	Subtotal Other	16,572	2,050	2,014	20,636	4,007	20,579
	Total	79,663	10,155	5,514	95,332	14,982	94,645
Kootenai	National Forest	54,545	2,226	155	56,926	44,685	99,230
	State					173	173
	Private	3,160	541		3,701	10,845	14,005
	Subtotal Other	3,160	541		3,701	11,018	14,178
	Total	57,705	2,767	155	60,627	55,703	113,408
All Forests	National Forest	117,596	10,328	3,655	131,579	55,660	173,256
	Public Domain	40	3		43		40
	Subtotal Federal	117,636	10,331	3,655	131,622	55,660	173,296
	State	734	1		735	173	907
	Private	18,998	2,590	2,014	23,602	14,852	33,850
	Subtotal Other	19,732	2,591	2,014	24,337	15,025	34,757
	Total	137,368	12,922	5,669	155,959	70,685	208,053

BLISTER RUST CONTROL, MOUNT RAINIER NATIONAL PARK, 1947

By
John C. Gynn, Operation Supervisor
Clarence M. Chapman, Pathologist

Ribes eradication work for the control of white pine blister rust on Mount Rainier National Park during 1947 was confined to the White River area as scheduled in the 1944 annual report. The work was accomplished with a crew that varied in size from 18 to 26 men under the direction of one experienced superintendent and one experienced foreman. During the season 2,134 acres were worked with an expenditure of .38 man-days per acre. Most of the work was in the vicinity of Rock Crusher Point on the east end of the area. This ribes area was larger than expected as the 1946 check had not covered the entire control unit. Two slides were found and worked that supported heavy Ribes viscosissimum which may have been the source of some infection at Sunrise Point. From Sunrise Point to the west end of the control area an intensive search was made in and around the scattered clumps of Pinus albicaulis. A number of large infected R. acerifolium were eradicated that had undoubtedly been spreading infection to the white pine. The White River campground area was reworked as originally planned, but additional work will be necessary as outlined below. Of the 2,134 acres worked in 1947, 1,612 acres were placed on maintenance, 315 acres will require a post check, and 207 acres of stream type will be checked or scouted before any future eradication work is done.

Canker elimination work was performed on both the Silver Forest and White River areas during the first few days of the season and during inclement weather. In the Silver Forest, using only eight men supervised by C. M. Chapman, 83 man-days were spent on 46 acres removing 18,960 cankers. On June 23 these men were moved to White River where the balance of the crew reported for regular ribes eradication work. During inclement weather between June 24 and July 7, 128 man-days were devoted to canker elimination work in Sunrise Park, 157,455 cankers being removed. At the White River campground seven man-days were employed removing 490 cankers.

RECOMMENDATIONS

Longmire-Silver Forest. The 1946 check on the Silver Forest area shows that a complete reworking, as estimated in 1944, will be necessary to put this area on a maintenance basis. This check also shows several concentrations of R. bracteosum on Tatoosh Creek and one near Narada Falls. These ribes concentrations should be eliminated in conjunction with the work on the main area. Hormone sprays can be used to eliminate the R. bracteosum at a minimum cost.

Canker elimination work in the Silver Forest area in 1947 covered only 46 acres before the eight men reporting early were moved to White River for regular ribes eradication work. A crew of 10 men should be employed in 1948 to do all necessary canker elimination work in the Silver Forest area.

The following recommendation is made for 1948 for ribes eradication and canker elimination work in the Longmire-Silver Forest area: For a complete 3-month period starting about June 10, a crew composed of 28 laborers, 10 crew leaders,

2 foremen (SP-6), and 1 superintendent (SP-7). It is recommended that 10 more laborers than estimated be hired at the start to take care of losses from quits, discharges, and those leaving early for school.

White River. The 1947 work in the White River area was completed as originally planned. During the year, however, several inspections for ribes were made in the streams and upland areas adjacent to the original control boundaries. Directly across White River, opposite the campground, a heavy concentration of R. bracteosum, R. laxiflorum, R. lacustre, and R. watsonianum was located. Also, just above the present control boundaries on White River and several of its tributaries the same type of ribes concentration was found to exist. Both of these concentrations are in stream type. One upland area, located between the White River campground and Sunrise Park, comprising approximately 200 acres of white pine pole and reproduction (P. monticola), is supporting many R. lacustre. This area has never been worked as it lies between the two control boundaries, but directly adjacent to the Sunrise Park white pine (P. albicaulis) area now on maintenance, and the White River campground (P. monticola) pole area also on maintenance.

These ribes concentrations are less than one mile from P. albicaulis in Sunrise Park and P. monticola in the White River campground, and all are possible sources of infection to the white pine being protected. Ribes should be eliminated from these areas in 1948. The stream type ribes are to be eradicated by the use of chemical sprays and the upland area is to be worked by a combination of hand and chemical methods.

The following recommendation is made for 1948 for the White River area: For a complete 3-month period starting about June 10, a crew of seven laborers, three crew leaders, and one superintendent (SP-7). The superintendent must be experienced in both chemical and hand methods of ribes eradication.

Conclusion. The program recommended for 1948 is designed to complete large-scale blister rust control work in the Park and to place the selected pine areas on as good a protection basis as is economically feasible. If the 1948 program is carried through as recommended, consideration should be given to the employment during the next several field seasons of a four or five-man maintenance crew under the direction of a competent foreman to conduct surveys and to perform canker elimination and ribes eradication work as necessary. The crew could progressively cover the entire control area over a period of years which may be more satisfactory than attempting to maintain control standards with a 30-man crew at periodic intervals.

The above proposals were discussed and met with the approval of officials of the National Park Service, Bureau of Entomology and Plant Quarantine, and Bureau of Plant Industry during a meeting held at Longmire, Washington, August 27-28, 1947.

Experience in Mount Rainier National Park has shown the difficulties of protecting small white pine areas in rugged topography where ribes are numerous and widespread and where frequent fogs of long duration envelop the white pine stands. Under these conditions permanent protection is not feasible by virtue of the longer distance of spread of rust from ribes to pine. Nevertheless, on the White River, Longmire, and Silver Forest areas, experience has demonstrated that control

work, even though behind schedule, can greatly retard the damaging effect of the rust and that a nominal maintenance program can preserve the pine in these areas for many years. Eventually all or most of the pine may be lost, but in the case of P. monticola the pine can be protected sufficiently to permit the climax species to gradually take over the site. Any changes which may occur should take place without the drastic upset in aesthetic values as is the case in the Stevens Canyon and Cowlitz areas where practically unrestricted rust development has caused an extensive unsightly scene of diseased and dying trees which will persist for years. The pine in the White River, Longmire, and Silver Forest areas already has been saved from this sudden destruction and the performance of the recommended control and maintenance work will extend the life of the pine stands many decades.

RESULTS

The following tables show statements of expenditures, results of the 1947 field work and accumulative results of all work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
MOUNT RAINIER NATIONAL PARK

Item	National Park Service Regular BLR-5
Personal Services	$13,369.50
Travel & Transportation	56.74
Contractual Services	954.90
Supplies & Materials	1,494.02
Total	$15,875.16

TABLE 2

SUMMARY OF RIBES ERADICATION, 1947
MOUNT RAINIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species						Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes bracteosum	Ribes watsonianum	Ribes laxiflorum	Ribes acerifolium		Man-Days	Ribes
White River	Third	2,134	805	16,747	7,398	206	1,070	2,144	571	28,136	.38	13

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1930-1947
MOUNT RAINIER NATIONAL PARK

Class	Gross Acres	Net Acres	Man-Days	Total Ribes	Per Acre	
					Man-Days	Ribes
NP-Reg.	10,486	9,677	10,164	977,588	.97	93
NP-CCC	10,960	6,089	12,692	1,293,167	1.16	118
Total	21,446	15,766	22,856	2,270,755	1.07	106

TABLE 4

SUMMARY OF RIBES ERADICATION, 1930-1947
MOUNT RAINIER NATIONAL PARK
(NET CONTROL AREA)

Area	Working	Acres	Man-Days	Ribes Destroyed								Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes bracteosum	Ribes watsonianum	Ribes laxiflorum	Ribes acerifolium	Ribes sanguineum	Ribes triste		Man-Days	Ribes
Longmire	First	900	1,599	225,968		98,875		59,308	8,642	16		392,809	1.78	436
	Second	888	797	30,938		24,332		2,394	2,888	50		60,602	.90	68
	Other	2,382	3,754	73,045		19,003		3,846	42,051	15		137,960	1.58	58
	Total	4,170	6,150	329,951		142,210		65,548	53,581	81		591,371	1.47	142
White River	First	2,681	3,145	370,832	84,125	5,429	140,613	10,564	11,228	189	752	623,732	1.17	233
	Second	2,652	2,484	70,531	16,315	2,330	6,941	16,229	4,537			116,883	.94	44
	Other	6,263	2,668	33,837	12,862	433	13,892	2,867	5,759			69,650	.43	11
	Total	11,596	8,297	475,200	113,302	8,192	161,446	29,660	21,524	189	752	810,265	.72	70
All Areas	First	3,581	4,744	596,800	84,125	104,304	140,613	69,872	19,870	205	752	1,016,541	1.32	284
	Second	3,540	3,281	101,469	16,315	26,662	6,941	18,623	7,425	50		177,485	.93	50
	Other	8,645	6,422	106,882	12,862	19,436	13,892	6,713	47,810	15		207,610	.74	24
	Total	15,766	14,447	805,151	113,302	150,402	161,446	95,208	75,105	270	752	1,401,636	.92	89

BLISTER RUST CONTROL, GLACIER NATIONAL PARK, 1947

By
John C. Gynn, Operation Supervisor
Clarence M. Chapman, Pathologist

The 1947 blister rust control program included work on East Glacier, Two Medicine, and Oldman Lake areas. The project was efficiently administered and all units were installed as rapidly as available man power and weather permitted. The men hired for ribes eradication work were of high caliber and many will be top material for future supervisors.

East Glacier. Acres worked 446, man-days per acre 1.61, ribes removed per acre 35. Work was started June 24 and the entire area was covered by August 15. The crew consisted of 15 to 20 men under the direction of 1 experienced foreman and 1 experienced superintendent who also assisted with the direction of the Two Medicine job. A preseason check showed that the entire area required reworking. Many old crowns had resprouted and ribes regeneration had occurred along Roes Creek and along the cliffs at the campground perimeter. The grass areas and semistream type bordering St. Mary Lake contained many Ribes inerme and took considerable searching time as all ribes were hidden in the grass and brush. Inclement weather conditions prevented making a final check of the work. This check will be made in 1948. Very light blister rust infection was found on both white pine and ribes along the northeast control boundary.

Two Medicine. Acres worked 707, man-days per acre .86, ribes per acre 92. Work started June 24 and was continued until August 11. This was a 20-man project and was the only one where it was necessary to use a foreman with no previous ribes eradication experience. The crew was trained by an experienced superintendent who later took over the Oldman Lake camp. A four per cent check was made before the work plan was determined. The check showed that many more ribes existed on the west and north sides of the area than were known to be present. The high ribes figure was caused by many seedlings in the stream type and on several small upland cliff areas. A check was made of the worked area late in the season, and it appears that one-third of the upland area will need a reworking by 1950. An additional working should also be performed at that time on the stream type and the several small cliff areas due to the ribes regeneration occurring in those types.

Oldman Lake. Acres worked 680, man-days per acre 1.23, ribes per acre 158. The area is adjacent to Oldman Lake which is eight miles by pack trail from the Two Medicine Ranger Station. Camp construction was completed July 11 at which time the area became free of snow and ribes eradication work was begun. Work continued without interruption until September 6. Camp strength averaged approximately 30 high caliber men supervised by an experienced superintendent and one inexperienced foreman. The area presented many eradication difficulties as extremely heavy ribes existed in the dense brush under part of the mature timber and on the open slopes at the east side of the control area. The area is bounded by cliffs and steep rocky slopes on three sides, much of which supports heavy brush, suppressed pine, and many ribes. These areas are so steep that at least two to three surface acres are worked for every one claimed. The work accomplished was of good quality for initial working on this type of ground. An advance check

map of the area was available showing the location and limits of all heavy ribes concentrations. No regular check was made of 1947 work as the high number of ribes removed would automatically place most of this area in a rework category. All mature and pole types will be checked in 1948 before any reworking is performed, deleting all areas not requiring further work. No infection was found on the west side of the area, but light infection is present on ribes and pine reproduction on the east side. This pine is thrifty and has been closely associated with heavy ribes in ideal conditions for the spread and intensification of the disease. Most of the infection found was of 1941 origin although one canker was of 1938 origin and one of 1939. No control status boundaries will be established until after the 1948 work has been completed as outlined in recommendations for this area. Following the regular check a plan for future control can be made and definite maintenance boundaries plotted.

RECOMMENDATIONS

East Glacier. A thorough check with flankers in 1948 to determine the control status of the area. Any additional work found necessary, to be done in 1950.

Two Medicine. No further work is necessary until 1950, at which time the area should receive a four per cent check with flankers to determine the amount and location of additional work necessary. The estimate made in the 1945 report will probably suffice.

Oldman Lake. In 1948 complete all initial work as follows: 118 acres on the north side of the area. Work the small areas of cliffs, rock ledges and precipitous slopes supporting heavy ribes concentrations on the south and northwest sides of the area. Treat the 60 to 80 acres of heavy ribes at the east control boundary on the south side of Dryfork Creek. If a chemical completely effective on the ribes species involved is not available in 1948, work on this area should be postponed as hand methods would not be economically feasible. After completion of initial work, rework should be started in the white pine reproduction, pole and mature types if the check indicates additional work necessary.

A small canker elimination job is necessary in the white pine reproduction at the east end of the area. Light infection is present and many trees would be saved by this treatment. The immediate infection hazard would also be reduced.

The following recommendation is made for 1948 for the Oldman Lake area: For a complete two and one-half month period starting in late June a crew of 26 men and 1 superintendent with both chemical and hand eradication experience.

Lake McDonald and Snyder Creek Area. On random inspections made in 1947 infected ribes were found in the upland and stream types at the north end of the area. Snyder Creek stream type is supporting ribes seedlings. As most of the Lake McDonald area is on or approaching a maintenance standard a thorough check of the area using the checker flanker method should be made at the beginning of the 1948 season. The 1948 ribes eradication work to be determined from the results of this check.

Park Headquarters. Random inspections made in 1947 located infected ribes within the control area along the river at the Park entrance highway bridge.

Infected ribes were found in the powder house area. Early in 1948 a complete check using the checker flanker method should be made. Only a small amount of ribes eradication work is anticipated as being necessary in 1948. Since the Lake McDonald crew will probably be stationed at Park Headquarters, it would be advisable to utilize this crew for the work on the Headquarters area. This will eliminate the working planned for 1950.

The following recommendation is made for 1948 for the Lake McDonald and Park Headquarters areas: For a complete 3-month period starting about June 10 a crew of 15 men and 1 foreman or superintendent. In order to obtain the complete effective working period it is recommended that 10 more laborers than estimated be hired at the start, to take care of time lost from rain, fire, and crew reductions resulting from quits, discharges, and those leaving early for school.

RESULTS

The following tables show statements of expenditures, results of the 1947 field work and accumulative results for all work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
GLACIER NATIONAL PARK

Item	National Park Service Regular BLR-5
Personal Services	$34,843.40
Travel & Transportation	188.09
Communication Service	4.87
Other Structural Services	9,663.76
Supplies and Materials	2,012.73
Equipment (includes fixed)	3,923.83
Salary & Expense, Checkers	306.84
Total	$50,943.52

TABLE 2

SUMMARY OF RIBES ERADICATION, 1947
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species				Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes setosum	Ribes inerme		Man-Days	Ribes
Two Medicine	Second	385	382	21,249	1,085	69	75	22,478	.99	58
	Other	322	224	40,958	1,469		140	42,567	.70	132
	Total	707	606	62,207	2,554	69	215	65,045	.86	92
East Glacier	First	58	24	1,753	339	670	980	3,742	.41	65
	Second	302	520	15,618	3,005	21,070	1,114	40,807	1.72	135
	Other	86	174	13,373	578	1,633	275	15,859	2.02	184
	Total	446	718	30,744	3,922	23,373	2,369	60,408	1.61	135
Oldman Lake	First	680	836	107,394	14			107,408	1.23	158
All Areas	First	738	860	109,147	353	670	980	111,150	1.17	151
	Second	687	902	36,867	4,090	21,139	1,189	63,285	1.31	92
	Other	408	398	54,331	2,047	1,633	415	58,426	.98	143
	Total	1,833	2,160	200,345	6,490	23,442	2,584	232,861	1.18	127

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1939-1947
GLACIER NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Per Acre	
				Man-Days	Ribes
NP-Reg.	2,914	3,875	435,589	1.33	149
NP-CCC	2,633	2,833	323,841	1.08	123
NP-CPS	2,776	2,285	214,156	.82	77
Total	8,323	8,993	973,586	1.08	117

TABLE 4

SUMMARY OF RIBES ERADICATION, 1939-1947
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species				Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes setosum	Ribes inerme		Man-Days	Ribes
Park Headquarters	First	681	445	32,708	43,176	32,986		108,870	.65	160
	Second	619	201	3,277	2,518	1,195	2	6,992	.32	11
	Other	261	260	2,162	3,678	1,064		6,904	1.00	26
	Total	1,561	906	38,147	49,372	35,245	2	122,766	.58	79
Two Medicine	First	707	1,243	74,509	4,193	6,388	23,072	108,162	1.76	153
	Second	685	739	84,693	2,498	4,631	33,679	125,501	1.08	183
	Other	366	340	52,188	1,501		12,596	66,285	.93	181
	Total	1,758	2,322	211,390	8,192	11,019	69,347	299,948	1.32	171
Lake McDonald	First	1,777	1,201	43,036	4,289	35,777		83,102	.68	47
	Second	1,197	689	14,177	1,530	18,814		34,521	.58	29
	Other	342	205	4,682	126	1,375		6,183	.60	18
	Total	3,316	2,095	61,895	5,945	55,966		123,806	.63	37
East Glacier	First	446	1,289	46,129	15,236	11,712	111,862	184,939	2.89	415
	Second	388	720	37,434	5,497	30,577	2,385	75,893	1.86	196
	Other	86	174	13,373	578	1,633	275	15,859	2.02	184
	Total	920	2,183	96,936	21,311	43,922	114,522	276,691	2.37	301
Oldman Lake	First	768	1,487	150,273	102			150,375	1.94	196
All Areas	First	4,379	5,665	346,655	66,996	86,863	134,934	635,448	1.29	145
	Second	2,889	2,349	139,581	12,043	55,217	36,066	242,907	.81	84
	Other	1,055	979	72,405	5,883	4,072	12,871	95,231	.93	90
	Total	8,323	8,993	558,641	84,922	146,152	183,871	973,586	1.08	117

BLISTER RUST CONTROL, YELLOWSTONE NATIONAL PARK, 1947

By
John C. Gynn, Operation Supervisor
Clarence M. Chapman, Pathologist

Ribes eradication for the control of white pine blister rust in Yellowstone National Park was performed on the Mount Washburn and Craig Pass areas. A total of 4,877 acres was initially worked, removing 79 ribes per acre at an expenditure of .65 man-days per acre.

Mount Washburn. One thousand five hundred and fifty-seven acres received initial eradication work, 231 ribes per acre being removed at a cost of 1.79 man-days per acre. Work started June 26 and continued until September 6. The crew varied in size from 41 to 78 men in the field, with 1 experienced superintendent and 4 foremen. All foremen but one had previous blister rust control experience although not as foremen. The men employed for ribes eradication were of high quality. Many difficult areas were encountered in the cliffs and rocks on the east, south and west sides of Mount Washburn, necessitating the use of ropes and boatswain's chair. Nearly all of this type of work in the area was completed. The decapitation method was used extensively in the heavy Ribes montigenum growths. Over 1,200 pounds of ammonium sulfamate powder were applied to broken roots, and to ground where root masses were removed. The R. petiolare on Carnelian Creek were sprayed with 2,4-dichlorophenoxyacetic acid. After checking, the 1947 work was classified as follows: 245 acres of maintenance, 248 acres of rework, and 1,064 acres of post check. Although the final check showed the areas classified as post check as being practically free of ribes, this classification was necessary because of the number of ribes removed and the danger of regeneration in certain spots. After a check is made in 1949 or 1950 a large percentage of the area may go directly into the maintenance category. A check of the Mount Washburn areas worked in 1946 shows that these areas should be reworked. An advance check shows that all unworked area between the Canyon-Tower Falls road and the west control boundary, from Dunraven Pass on the south, to the north end of the control area, will have to be covered as no ribes-free acreages are present.

Craig Pass. Three thousand three hundred and twenty acres were initially worked or scouted, at a cost of .12 man-days per acre, removing 7 ribes per acre. Work started June 25 and was completed July 30. The crew consisted of 30 men and 2 experienced foremen. On July 12, 15 men and 1 foreman were moved to the Mount Washburn project, and on completion of work the rest were transferred. Both crew and foremen were high quality men and exceptionally good work resulted. Control and work area boundaries were determined from the 1946 advance check map. Although the check indicated much of the area to be ribes-free, all areas not needing an intensive coverage were systematically scouted but no ribes were found. Several small cliff areas required the use of ropes and boatswain's chair to remove ribes on overhanging ledges and precipitous slopes. No regular checking was done after working other than random inspections. Of the 3,320 acres in the control area, 2,881 were placed on maintenance and 439 on post check. No reworking will be necessary until after the regular check has been completed and a future control plan made.

Blister Rust Infection. Although a number of inspections were made in the Mammoth control area this season no infection was found. On Slide Lake Creek three miles north of Mammoth Hot Springs, infection on R. petiolare was found to be twice as heavy as in 1946. Only a few white pine are present in the immediate vicinity of this infection, and all were found to be free of rust. The following areas were examined for infection with negative results: Craig Pass, Mount Washburn, Gibbon River, Gardiner River, Yellowstone River (at Tower Falls and near Gardiner, Montana), Lamar River (near junction with the Yellowstone), and Carnelian Creek.

RECOMMENDATIONS

Mammoth. The following recommendation is made for 1948 for the Mammoth area: Make an early season check over the entire area, using the checker flanker method, to eliminate any ribes-free acreage from the 1948 working. Rework upland areas showing ribes. Spray resprouting R. petiolare on Glen Creek, Clematis Gulch, and the seedling spots with 2,4-dichlorophenoxyacetic acid. This work will require a crew of 30 men, 1 experienced foreman, and 1 experienced superintendent for a 2-week period starting between June 7 and 14.

Mount Washburn. Complete initial working between the Canyon-Tower Falls road on the east, the control boundary on the west, and the Dunraven Pass 1947 work limits on the south. With the completion of the survey and the resulting accurate map of the Mount Washburn area, the western boundary has been set at Carnelian Creek. This location is necessary to secure adequate protection zones and to eliminate infection hazards along Carnelian Creek. After an advance check to eliminate any ribes-free area, complete initial work on the 20-chain protection strip on the east side of the control area. Finish work on the Carnelian Creek stream type. Rework all the area worked in 1946 on the south side of the Mount Washburn-Dunraven Pass ridge as indicated by the 1947 regular check. The following estimate is made for 1948 for the Mount Washburn area: For a complete $2\frac{1}{2}$-month period starting between June 21 and 28 a crew of 30 men, 1 foreman, and 1 superintendent. This crew would be transferred from Mammoth on completion of ribes eradication work there.

Craig Pass. In 1948 make a 4 per cent check with flankers on the areas where intensive ribes eradication work was performed in 1947. No eradication work is anticipated in 1948.

In order to obtain the complete effective working period it is recommended that 7 more laborers than estimated be hired at the start, to take care of time lost from rain, fire, and crew reductions resulting from quits, discharges and those leaving early for school.

RESULTS

The following tables show statements of expenditures, results of the 1947 field work, and accumulative results of all work done to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
YELLOWSTONE NATIONAL PARK

Item	National Park Service Regular BLR-5
Personal Services	$53,419.55
Travel & Transportation	1,113.78
Subsistence	1,503.15
Supplies & Materials	4,724.66
Salary, Checkers	488.70
Total	$61,249.84

TABLE 2

SUMMARY OF RIBES ERADICATION, 1947
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species					Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes montigenum			Man-Days	Ribes
Mount Washburn	First	1,557	2,780	67,191	1,953	11,308	381	279,601	360,434	1,101	1.79	231
Craig Pass	First	3,320	392	7,599	2,962		2,340	9,582	22,483		.12	7
All Areas	First	4,877	3,172	74,790	4,915	11,308	2,721	289,183	382,917	1,101	.65	79

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1945-1947
YELLOWSTONE NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
NP-CPS	1,567	992	95,769	765	.63	61
NP-Reg.	5,476	3,940	477,117	2,157	.72	87
Total	7,043	4,932	572,886	2,922	.70	81

TABLE 4

SUMMARY OF RIBES ERADICATION, 1945-1947
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species							Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes setosum	Ribes cereum	Ribes montigenum			Man-Days	Ribes
Mammoth	First	1,578	1,038	8,322	2,331	18,990		63,001	12,215		104,859	1,646	.66	66
	Second	152	67			2.295		3,478	621		6,394	175	.44	42
	Total	1,730	1,105	8,322	2,331	21,285		66,479	12,836		111,253	1,821	.64	64
Mt. Washburn	First	1,993	3,435	72,621	3,028	11,308	381			351,812	439,150	1,101	1.72	220
Craig Pass	First	3,320	392	7,599	2,962		2,340			9,582	22,483		.12	7
All Areas	First	6,891	4,865	88,542	8,321	30,298	2,721	63,001	12,215	361,394	566,492	2,747	.71	82
	Second	152	67			2.295		3,478	621		6,394	175	.44	42
	Total	7,043	4,932	88,542	8,321	32,593	2,721	66,479	12,836	361,394	572,886	2,922	.70	81

DEVELOPMENTAL WORK IN METHODS OF RIBES ERADICATION, AND PROGRESS OF RIBES ECOLOGY AND DISEASE CONTROL STUDIES IN THE NORTHWESTERN REGION FOR 1947

By

V. D. Moss, Forest Ecologist; C. R. Stillinger, Pathologist;
R. T. Bingham, Agent; and H. R. Offord, Pathologist

FOREWORD

Activities of the development and improvement project BLR-1-6 for the calendar year 1947 include office, laboratory, greenhouse, and field work. The present annual report, as in past years, is primarily on field work. The material is presented in three sections. Section I is a status report on the various field studies in methods of ribes eradication, problems of the ecology of ribes, and disease control investigations currently in progress. Section II is a discussion of these studies and the presentation of results. Section III is a report of laboratory and greenhouse activities and includes a listing of special reports and publications for the year 1947.

Results of the 1946 studies in the use of 2,4-dichlorophenoxyacetic acid as a herbicide for ribes are given under chemical tests in 1946, section II. Chemical investigations currently in progress are reported under herbicides tested in 1947. Major attention this season was directed toward tests of 2,4,5-trichlorophenoxyacetic acid as a herbicide for ribes eradication. Spray equipment also came in for its share of attention including tests with both back pack and power units. The Hi-Fog gun, described and shown in plate 1 of this report, proved an important addition to spray equipment. Many improvements were made in the shop and field to increase the efficiency of operating power sprayers. New type nozzles were developed for mist spraying with power at a 2-week's spray school in October at Clarkia, Idaho. Tests were also conducted to determine size and length of hose, and methods of organizing a power spray crew for the best job possible.

Recommendations for practical chemical work are being deferred except as noted. Special memorandum of instructions will be provided and sent to the field as early in the spring as possible after inspecting past season's tests. Stocks of 2,4-D on hand should be used for spraying Ribes petiolare according to previous instructions. Similarly, Ammate on hand should be used as previously instructed.

A status report is presented on the studies of the ecology of ribes in relation to eradication control measures and timber management practices. Except for making current inspections of all ecological plots little time was devoted to this field of study. Instead, every effort was concentrated toward the more important projects at this time of chemical investigations and the development of white pine management plans closely coordinated with the problems of the ecology of ribes. As a result no progress reports are included this year although a brief summary of each ecological study is given under section I.

Under disease control plot studies infection conditions on ribes during 1947 are reported by Stillinger. There is also included a study of rust damage to white pine reproduction and pole stands resulting from long periods of exposure to ribes populations. Basic data for these damage studies were obtained from permanent plots on the St. Joe and Clearwater Forests. General recommendations are

given for more closely observing the extent of rust damage to pole stands in the region. A report is made of the increase in spread of Tuberculina maxima, a parasitic organism of blister rust cankers.

Field activities by Bingham during 1947 ranged from independent studies in disease control investigations to providing assistance in the establishment of chemical tests and the practical application of stocking-damage surveys on two control operations. An annual inspection was made of the R. lacustre small-bush study on the Coeur d'Alene National Forest. Additional soil samples were secured and analyzed to determine the usefulness of soil analysis by rapid chemical tests in judging the ribes potential of an area prior to the decisions of cutting practices. All field activities are reported upon herein or in special reports.

I. SUMMARY

A. Tests of 2,4-Dichlorophenoxyacetic Acid and 2,4,5-Trichlorophenoxyacetic Acid for Ribes Eradication

1. Status of work. Field tests in 1946 of 2,4-D on R. petiolare, R. viscosissimum, and R. lacustre were examined to determine the effectiveness of kill. Treatment of R. petiolare with the butyl ester of 2,4-D during a period of unsettled weather in the early spring season resulted in a higher per cent bush kill than treatment with the sodium and ammonium salts of 2,4-D. Rain seems to be without effect on the toxicity of ester formulations of 2,4-D. However, it is undesirable to spray during a rain or immediately thereafter when the foliage is wet. An interval of 4 hours of dry weather after spraying will provide an adequate margin of safety in applying aqueous solutions of the ammonium or sodium salts of 2,4-D. Chemical concentrations as low as 50 p.p.m. of the butyl ester of 2,4-D gave 100 per cent bush kill in early season applications. For practical field work in the treatment of R. petiolare 2,4-D is used in spray solution at a concentration of 800 p.p.m.

   Neither the ammonium nor amine salts, nor ester formulations of 2,4-D in spray solution have produced effective results in the treatment of mature R. lacustre bushes. At best only a small amount of live stem can be killed. On the other hand about 50 per cent kill is possible in the treatment of fast growing R. lacustre seedling with concentrations of 1,000 p.p.m. or higher of 2,4-D. With thorough coverage of leaves and stems 100 per cent of R. viscosissimum seedlings can be killed with spray solutions of 2,4-D at 1,000 p.p.m. or higher. For the reason mature bushes of R. viscosissimum are only moderately susceptible less than 50 per cent can be killed with concentrations of 1,000 p.p.m. or higher of 2,4-D. Aerial coverage of leaves and stems with spray solution proved as effective in the treatment of seedlings as the combined methods of aerial coverage and soil drench.

   The extensive program developed this season in testing the new hormone 2,4,5-trichlorophenoxyacetic acid as a herbicide for ribes is of major interest in the region. Tests with this chemical in the greenhouse at Berkeley during the winter resulted in kill of R. lacustre, a species

which has been highly resistant to 2,4-D. For the reason the effectiveness of hormone sprays can rarely be determined the season of treatment, final results of tests with 2,4,5-T must await the 1948 growing season. A late fall season observation of these tests showed that ribes bushes treated with 2,4,5-T were not resprouting the season of treatment irrespective of the concentration of parent acid. On the other hand, nearly all R. lacustre and R. viscosissimum bushes sprayed with 2,4-D were showing resprouts by the middle of September. Dates of applying 2,4,5-T and 2,4-D sprays were the same for this comparison.

Lack of any resprouting from bushes treated with 2,4,5-T may or may not be any indication of final results this coming spring. In order to obtain a preseasonal index of the effectiveness of 2,4,5-T, a number of R. lacustre and R. viscosissimum treated bushes were carefully potted in October and placed in the laboratory's culture chamber. These particular bushes were treated with the amine salt of 2,4,5-T acid in a concentration of 1 part to 9 parts water. Date of treatment was July 8. Three of four R. lacustre crowns have resprouted. No resprouts have developed from R. viscosissimum. This attempt to induce resprouting in the culture chamber has shown that treatment of R. lacustre with 2,4,5-T will be much more satisfactory than with 2,4-D. Whatever the final results of this season's tests it must be remembered that all treatments were made rather late in the growing season at a time when ribes were fully foliated and were maturing fruits. May and June treatments, which are scheduled for this coming spring, will be the final criterion for judging the effectiveness of 2,4,5-T sprays on mature R. lacustre and R. viscosissimum bushes.

Many improvements were made this season along the lines of obtaining and developing suitable spray equipment for the region. One important contribution for chemical eradication work was in procurement of a number of Hi-Fog guns for mist spraying of hormone concentrates. A small portable power sprayer also found an important place in the spraying program. The large truck-mounted power units were used continuously through the spray season and to great advantage on all the forests. Two weeks were spent in chemical methods development by the entire technical organization in October at Clarkia, Idaho. Tests were conducted to determine efficient methods of laying hose line, efficient lengths and sizes of spray hose, and methods of organizing spray crews to increase acreages worked per man-day. A number of new type nozzle heads were developed at this school which give promise of better coverage with less amounts of chemical solution per acre.

B. Ecological Studies of Ribes and Western White Pine

1. Status of work. The more pressing problems in chemical investigations and the development of white pine management plans this season took precedence over the time which usually would have been given to ecological studies. Only the essential work necessary to record current data and maintain permanent ribes ecology plots was carried on this year. Studies currently in progress on the ecology of ribes and western white pine are summarized as follows:

(a) Plots of the influence of variable light and moisture conditions on germination, growth, and development of upland ribes and white pine seedlings were inspected for new seedling germination. Seeds of R. lacustre are continuing to germinate on all three soil surfaces; duff, mineral and burnt-mineral, under full shade conditions. Seedlings of R. lacustre originating by soil surfaces in 1947 at the full shade station are as follows: 31 seedlings on duff surface, 17 seedlings on mineral surface, and 5 seedlings on burnt-mineral surface. No new seedlings were found for either R. viscosissimum or white pine. Previous reports on this study are contained in the 1940 to 1946 annual reports. Current inspections for new seedlings is the only phase of this study being continued.

(b) The study of longevity of ribes seeds following logging or a fire was extended into many new areas. It is the purpose of this study to determine for how long after logging or a fire the undisturbed stored ribes seed in the soil will remain viable. Sufficient data will have been accumulated with the 1948 season to give enough basic information of interest for the annual report. One phase of this study, which involves the collection, screening, identification and laboratory germination of ribes seed collected from samples of the forest floor mantle, has been curtailed for reasons already explained. This phase of work will be emphasized in the 1948 project program now that adequate facilities have been developed in the laboratory for germinating ribes seed.

(c) Studies of slash disposal measures in relation to ribes control problems were continued in cooperation with the Forest Service, Potlatch Forests, Inc., and the Slash Disposal Committee of the Inland Empire Section, Society of American Foresters. The trend in slash disposal is away from complete to partial disposal of hazardous fuels along roads and on ridge tops. Such practices are to the advantage of blister rust control work in that ribes seedlings originating from the disturbance by fire are limited in number and inhabit small areas of the total cutting unit. Observations will continue to be made of slash study areas to determine relationships with ribes control problems and the regeneration of white pine.

(d) Studies of the ecology of ribes in relation to silvical practices in the western white pine type are being continued in cooperation with the Division of Timber Management, Forest Service, and the Northern Rocky Mountain Forest and Range Experiment Station. Work this season was directed toward the determination of ribes potentials on proposed sale areas. The Steamboat sale area on the Coeur d'Alene Forest occupied the majority of time normally devoted to ecological studies. Cutting in the Little East Fork of Steamboat has been completed which afforded an opportunity this season of examining the results of varying intensities of marking and cutting. Many of the cuttings produced a forest condition favorable for the suppression of ribes by the establishment of a balance between sunlight and canopy shade reaching the forest floor. Other management units were found overcut from the standpoint of practicing good

silviculture and obtaining ribes control. The sole weakness in marking resulted from placing too much reliance upon volume percentages without adjustment for difference in composition between slopes. Proposed plans for this coming season include the establishment of a number of 10-acre plots in the East Fork of Steamboat for the purpose of intensifying the over-all study of marking standards.

(e) Wide use was made this season of the habitat index in predetermining the potential ribes problem on an area. The seven factors which go to make up this ribes potential key are listed in the 1946 annual report. Some refinement in evaluating one factor in relation to another still must be made before the index can be expected to give consistently reliable results. The accuracy now obtainable is surprisingly high as judged by the number of ribes seedlings germinating from recent logging disturbances on those areas studied.

(f) Investigations are being continued in direct seeding of white pine. The objective is the development of better methods for preconditioning of seed and for seed sowing.

C. Disease Control Plot Studies

1. Status of work. The annual inspection of ribes by Stillinger on permanent plots throughout the region showed more bushes and leaves infected this year than in 1946 but the intensification of rust on ribes was considerably less. The dry summer months of July and August probably prevented the rust from intensifying. Nevertheless, spread of the rust from ribes to pine probably amounted to a major wave of infection this fall season due to favorable weather conditions, and to the fact that more bushes and leaves carried infection than in normal years.

Besides completing annual inspections and maintaining all permanent disease control plots, Stillinger gave special attention to the amount of rust damage in stands of reproduction and pole timber which have been exposed to variable numbers of ribes for periods of 15 to 20 years. General location of stands examined on the St. Joe Forest include a permanent disease control plot in the Middle Fork drainage of the St. Maries River, Crystal Creek plot 11, Squaw Creek and the Upper Basin near Elk River, and a stand of reproduction in the vicinity of Camp 205. On the Clearwater Forest the Snake Creek pole stand was examined, Quartz Creek, the Powder House area, and a pole stand near Blister Rust Control Headquarters. All the stands examined showed that losses from the rust approach 100 per cent when pine is left exposed to ribes for periods of 15 to 20 years.

Because of wide interest in the effects of distribution and density of western white pine stocking upon estimates of the degree of blister rust damage in a stand, an intensive investigation on this important control question was inaugurated this season by Bingham. Sampling for damage in relation to stocking is by four 10-year age classes, 0 to 40. Density of stocking is segregated into three intensities; light, medium and

heavy, as is the amount of blister rust damage. About half the sampling necessary to obtain sufficient representation within each age group, stocking intensity, and rust damage class was completed this season. Each of the three stocking intensities for each stand age class will have samples of light, medium and heavy rust damage. A progress report is given covering sampling methods and preliminary results. During the fall season Bingham assisted two of the control operations in putting stocking-damage surveys into practice.

Much of Bingham's time was devoted to assisting in the establishment of chemical tests on three of the four north Idaho forests. This included the examination of chemical tests in 1946 and the establishment of tests in 1947. The R. lacustre small-bush study located in the Ames Creek drainage on the Coeur d'Alene National Forest was examined to determine the amount of rust on ribes. A preliminary report of this study was issued June 18, 1947, as Serial No. 140.

In order to determine the practicability of applying soil analysis by rapid chemical tests in the determination of ribes potentials, forest soil samples along survey strips were secured from the Little East Fork drainage of Steamboat Creek in the Coeur d'Alene National Forest. This drainage was selected because estimates of ribes potentials in each stand had been made by an ecological key and cutting operations were complete as of 1947. After ribes have germinated in 1948, an opportunity will be afforded for re-examining soil analysis data in relation to ribes germination as well as to observe the accuracy of predetermining ribes potentials by the presently employed ecological key.

II. FIELD WORK

IMPROVEMENT OF CHEMICAL METHODS FOR RIBES ERADICATION

The only chemical tested in the field during 1946 was 2,4-dichlorophenoxyacetic acid. Ammate (ammonium sulfamate) was employed by the control operations for practical spray and decapitation work.

Results of 2,4-D tests on stream type R. petiolare and R. lacustre, Middle Fork of the St. Maries River, St. Joe National Forest, Clarkia, Idaho, are shown in table 1. Commercial formulations of a 60 per cent sodium salt, an 83-1/3 per cent ammonium salt, and a 40 per cent butyl ester of 2,4-D were used for the study. A dosage of 1 gallon per milacre was applied as an aerial and soil drench with the back pack type sprayer. The chemical concentration of parent acid for the early season June 5 tests was 50, 100, 200, and 500 p.p.m. Day air temperature during application was around 70 degrees. Weather was partly cloudy with a light shower falling about 1½ hours after treatment. This rain is believed responsible for the lower per cent bush kill in the sodium and ammonium salt tests as compared to results of the butyl ester series. Because of an oil base and an emulsifying agent used to disperse the esters of 2,4-D, the active ingredient (2,4-D) is not easily washed from a plant or diluted by rain. This fact largely accounts for the perfect bush kill at a time in the season when ribes are most susceptible for reasons of rapid growth development. Likewise, the esters appear

to be more readily absorbed than the salts by plants in early season when air temperatures are cool. The esters of 2,4-D are thus recommended for early spray work until weather becomes settled and day air temperature is in the seventies.

The July 30 tests of 2,4-D differed from the early season treatments only in the chemical concentration of parent acid. The acid content was increased and graduated by intervals of 100 from 200 to 500 p.p.m. This was done for the reason ribes were approaching the end of their growing season with fruits fully developed and beginning to color. When current year's wood begins to harden off about the time fruits commence to ripen, ribes gradually develop resistance to 2,4-D sprays which increases as the fall season approaches. This phenomenon occurs with all species of ribes, even R. petiolare, the most susceptible to 2,4-D sprays. However, the degree of resistance varies with individual plants within a species, especially about the time and after ribes have attained full season's growth.

TABLE 1

RESULTS OF 1946 SPRAY AND SOIL DRENCH TESTS OF 2,4-D ON R. PETIOLARE AND R. LACUSTRE, MIDDLE FORK ST. MARIES RIVER PLOTS, ST. JOE NATIONAL FOREST, CLARKIA, IDAHO

Plot No. and Date Treated		Type of 2,4-D Product	Parts Per Million	Per Milacre							
				R. petiolare				R. lacustre			
				No. Bushes				No. Bushes			
				Treated	Killed	Per Cent Bush Kill	Per Cent Live Stem Kill	Treated	Killed	Per Cent Bush Kill	Per Cent Live Stem Kill
6/5	1	60%	50	11	3	27	74	1			29
	2	Sodium	100	9	8	89	96	1			
	3	Salt	200	6	4	67	39				
	4		500	6	5	83	98				
	5	83-1/3%	50	7	5	71	58				
	6	Ammonium	100	4			56				
	7	Salt	200	9	7	78	96				
	8		500	8	8	100	100				
	9	40%	50	6	6	100	100				
	10	Butyl	100	10	10	100	100	2			
	11	Ester	200	8	8	100	100	1			
	12		500	13	13	100	100	1			
7/30	13	60%	200	1	1	100	100	4			
	14	Sodium	300	5	5	100	100				
	15	Salt	400	2	2	100	100				
	16		500	1	1	100	100				
	17	83-1/3%	200	3	3	100	100	1			
	18	Ammonium	300	4	4	100	100	1			
	19	Salt	400	7	3	43	94				
	20		500	7	7	100	100				
	21	40%	200	4	3	75	94				
	22	Butyl	300	8	8	100	100	3			
	23	Ester	400	4	3	75	99	1			
	24		500	4	4	100	100				

Weather during the July 30 tests was clear with day air temperature in the lower eighties. Variation in the per cent bush kill probably was a result of individual bushes differing in the degree of susceptibility to 2,4-D spray as already explained. Inadequate spray coverage of leaves and stems for lateness of treatment may have also resulted as full development of associated vegetation made it difficult to thoroughly search out all ribes stems and leaves. In spraying on a milacre basis there is always the possibility of missing trailing stems along or extending outside the plot boundary. In a couple of cases resprouting of the July 30 tests was from missed borderline stems but with the parent root crown well within the plot boundary. To obtain satisfactory kill with hormone sprays care must be taken to obtain thorough spray coverage of all stems and leaves. This practice must not be diverged from regardless of the species of ribes being treated, the stage of growth development, or the type of spray equipment used. The few R. lacustre bushes sprayed with 2,4-D in the R. petiolare plots revealed high resistance to hormone sprays.

In methods section of the 1946 annual report table 6, a series of tests was shown employing concentrates of butyl ester of 2,4-D as a spray for mature R. lacustre bushes. This study was established alongside the R. petiolare plots discussed in the previous paragraphs. The purpose was to determine whether chemical resistance might be lowered by treatment with concentrates. The parent acid content was graduated by intervals of 1,000 from 1,000 to 4,000 p.p.m. A dosage of 1 gallon per milacre was applied as an aerial and soil drench. The butyl ester was used as previous tests had been made on R. lacustre with the sodium and ammonium salts. As no bush kill was obtained with the concentrates of butyl ester, the results are of no importance for tabulation in this report. Neither the acids nor esters of 2,4-D have produced kill of mature R. lacustre bushes.

In the belief fast growing ribes seedlings might prove more susceptible to 2,4-D sprays than mature woody plants, a series of tests was established on the recent Hendrick's burn, Lower West Branch of Priest River, Kaniksu National Forest. The results of treating R. viscosissimum and upland R. lacustre seedlings are shown in table 2. The first series of treatments was made June 12 and the second series on August 6. Day air temperature and weather were favorable for both series of tests. The chemical concentrations of parent acid ranged from 500 to 3,000 p.p.m. The 40 per cent butyl ester as an aqueous spray was applied as an aerial and soil drench at the rate of 1 gallon per milacre. The average age of seedlings on the burn was three years with an occasional plant two and four years old. The chemical treatment of R. viscosissimim seedlings proved highly effective. All but one seedling was killed in each of the seasonal series tests. A concentration of 1,000 p.p.m. appears adequate from these tests for practical field work. A much better kill of R. lacustre seedlings was obtained than anticipated. All but one bush was killed in the June 12 tests. The few seedlings treated in the August 6 series showed an increased degree of chemical resistance developing with termination of current season growth development. It was on the basis of the results from this study that recommendations were submitted for practical spray work with 2,4-D in the treatment of R. viscosissimum seedlings on cutover and recently burned areas.

A question regarding method of applying 2,4-D sprays with aerial treatment alone compared to aerial treatment plus soil drench is answered in table 3. This

study was established on the Hendrick's burn previously described using 3 and 4 year seedlings for demonstration. The aerial and soil drench combination test was made with the back pack sprayer. For aerial coverage alone a rose type garden sprayer was employed for applying the spray solution. Table 3 shows the comparative amounts of solution applied with each sprayer. The 40 per cent butyl ester of 2,4-D in aqueous solution was used at concentrations ranging from 1,000 to 9,000 p.p.m. Twenty-five R. viscosissimum and five R. lacustre seedlings were included for each test. A 100 per cent bush kill was obtained in the treatment of R. viscosissimum seedlings by both methods of applying spray solution and for all concentrations of 2,4-D tested. Aerial treatment alone thus proved to be as effective as the combination aerial plus soil drench and with a considerable saving in amount of solution for the job. Treatment of R. lacustre seedlings was only partly successful. Method of applying spray solution did not make any appreciable difference in bush kill. Bush kill was fairly good with chemical concentrations of 5,000 p.p.m. and higher but results are inconsistent. Early season treatment when seedlings are producing new growth might have given better results than obtained with August tests.

TABLE 2

RESULTS OF 1946 SPRAY AND SOIL DRENCH TESTS OF ONE GALLON 2,4-D SPRAY PER MILACRE ON R. VISCOSISSIMUM AND R. LACUSTRE SEEDLINGS, HENDRICK'S BURN, LOWER WEST BRANCH OF PRIEST RIVER, KANIKSU NATIONAL FOREST, IDAHO

			Per Milacre							
			R. viscosissimum				R. lacustre			
			No. Bushes				No. Bushes			
Plot No. and Date Treated	Type of 2,4-D Product	Parts Per Million	Treated	Killed	Per Cent Bush Kill	Per Cent Live Stem Kill	Treated	Killed	Per Cent Bush Kill	Per Cent Live Stem Kill
6/12 1		500	18	18	100	100				
2	40%	750	16	15	94	99				
3	Butyl	1,000	18	18	100	100				
4	Ester	1,500	16	16	100	100	4	3	75	60
5		2,000	13	13	100	100	1	1	100	100
6		3,000	17	17	100	100	1	1	100	100
8/6 7		500	13	12	92	83				
8	40%	750	16	16	100	100				
9	Butyl	1,000	14	14	100	100	3			
10	Ester	1,500	17	17	100	100				
11		2,000	27	27	100	100				
12		3,000	19	19	100	100	1	1	100	100

TABLE 3

RESULTS OF 1946 AERIAL SPRAY VERSUS AERIAL AND SOIL DRENCH TESTS OF 2,4-D ON R. VISCOSISSIMUM AND R. LACUSTRE SEEDLINGS, HENDRICK'S BURN, LOWER WEST BRANCH OF PRIEST RIVER, KANIKSU NATIONAL FOREST, IDAHO

Plot No. and Date Treated	Type of Application	Butyl Ester of 2,4-D P.P.M.	R. viscosissimum				R. lacustre			
			No. Bushes				No. Bushes			
			Treated	Killed	Per Cent Kill	Per Cent Live Stem Kill	Treated	Killed	Per Cent Kill	Per Cent Live Stem Kill
8/7 1-A	Spray	1,000	25	25	100	100	5			18
1-B	Spray & Soil Drench	1,000	25	25	100	100	5	1	20	38
2-A	Spray	3,000	25	25	100	100	5	3	60	84
2-B	Spray & Soil Drench	3,000	25	25	100	100	5	1	20	42
3-A	Spray	5,000	25	25	100	100	5	5	100	100
3-B	Spray & Soil Drench	5,000	25	25	100	100	5	4	80	95
4-A	Spray	7,000	25	25	100	100	5	5	100	100
4-B	Spray & Soil Drench	7,000	25	25	100	100	5	3	60	87
5-A	Spray	9,000	25	25	100	100	5	5	100	100
5-B	Spray & Soil Drench	9,000	25	25	100	100	5	5	100	100

HERBICIDES TESTED IN 1947

Extensive field tests were undertaken this season with the plant growth regulator 2,4,5-trichlorophenoxyacetic acid. Major attention was given this hormone after greenhouse studies at Berkeley during the winter showed that R. lacustre could be readily killed by spraying leaves and stems with aqueous 2,4,5-T solution or esters of 2,4,5-T in kerosene. This species of ribes has been highly resistant to all tests with 2,4-D.

As soon as chemicals could be obtained, field tests were scheduled for the four North Idaho forests to study chemical concentrations, dosages, diluents, spray methods, and seasonal effect of applying 2,4,5-T. For field tests, an amine salt and an ester formulation of the parent acid of 2,4,5-T was employed in spray work. Both these formulations were prepared by a west coast chemical company. Concentration of parent acid was 1 pound per gallon of solvent. The amine salt of

2,4,5-trichlorophenoxyacetic acid was diluted in water for spray solution. The ester (ethyl) was diluted in kerosene and in standard stove or fuel oil. All applications of 2,4,5-T were made with the Hi-Fog gun.

Tests were initiated July 8 and replicated through September 3. Earlier season applications should have been made, but chemical formulations were not received until early July. Consequently, this season's work was started at a time when ribes were commencing to develop seasonal resistance to hormone sprays; this increases as the fall season approaches. The degree and rapidity with which resistance develops varies with ribes species, age of bush, and habitat. Full potentialities of 2,4,5-T cannot be determined from this season's late applications. It will be necessary to establish early season tests in 1948 during the time ribes are growing rapidly as this is the period of greatest susceptibility to hormone sprays.

Companion tests with 2,4,5-T were made with the methyl ester of 2,4-D diluted in kerosene or in fuel oil. A concentrate of the latter was prepared commercially by the same chemical concern on the west coast furnishing concentrates of 2,4,5-T. The amount of parent acid of 2,4-D contained in the formulation was 1 pound per gallon of solvent. Many other chemical spray tests were conducted during the season using special formulas of 2,4-D to which were added other chemicals or plant extracts. One of these is known as King's formula. To the ammonium salt of 2,4-D is added potassium chloride, ammonium phosphate, and glycerol. The quantities of each chemical going into this formula are given in the Clearwater and St. Joe Forest tables of spray and dust tests. The purpose of adding glycerine is to reduce evaporation of spray solution from leaves and stems and to lower surface tension of water. Potassium chloride and ammonium phosphate are added for the purpose of inhibiting resprouting, presumably by maintaining a buffered pH reaction slightly on the acid side.

Another formula tested added onion extract to the sodium salt of 2,4-D. The fact that significant increases occur in the herbicidal action of the salt of 2,4-D when onion extract is added was reported by C. L. Hamner of the Michigan Agricultural Experiment Station. It was later found that herbicidal action could be similarly increased by adding a sufficiently strong acid as phosphoric to give an unbuffered solution with a pH range between 2 and 3. Hamner reported that "the titratable acid (within its noninjurious range) rather than the pH value of a solution accounts for the increased effect of the 2,4-D herbicide." The onion extract for field tests was prepared by sectioning and grinding, then filtering the pulp. The proportion of onion extract to chemical solution is shown in the Clearwater, St. Joe, and Coeur d'Alene tables.

In addition to chemical spray tests, many decapitation studies were established applying 2,4-D concentrates to the cut portions of ribes stems, roots, and severed crowns. Height which stems were cut and treated was 1 inch, 2 inches, and 3 inches above the soil surface. A chemical concentration of 5, 10, and 20 per cent of a liquid 40 per cent butyl ester concentrate of 2,4-D measured volumetrically with water as a diluent and applied from a spouted oil can was used for the decapitation work. Both R. lacustre and R. viscosissimum were included in this study. A small amount of dusting work was undertaken with a 5 and 15 per cent isopropyl ester dust of 2,4-D. Application was made with an inexpensive type of garden duster.

Testing and use of new chemicals always present the problems of developing suitable equipment for the job. The Hi-Fog gun manufactured by Banta & Driscoll Company, Los Angeles, California, was used in applying nearly all the spray solution tests. This gun is a high pressure back pack mist type of sprayer with a liquid capacity of 3-3/5 pints. A pressure cylinder is filled with spray solution by means of a hand operated hydraulic pump. The solution is forced against a permanent nitrogen charge of 350 pounds pressure contained in the top of the cylinder by a floating piston. When fully charged the cylinder has an initial operating pressure of 1,000 pounds which drops to the 350 pound nitrogen pressure upon exhausting the 3-3/5 pints of spray solution. Weight of an empty gun is 26½ pounds.

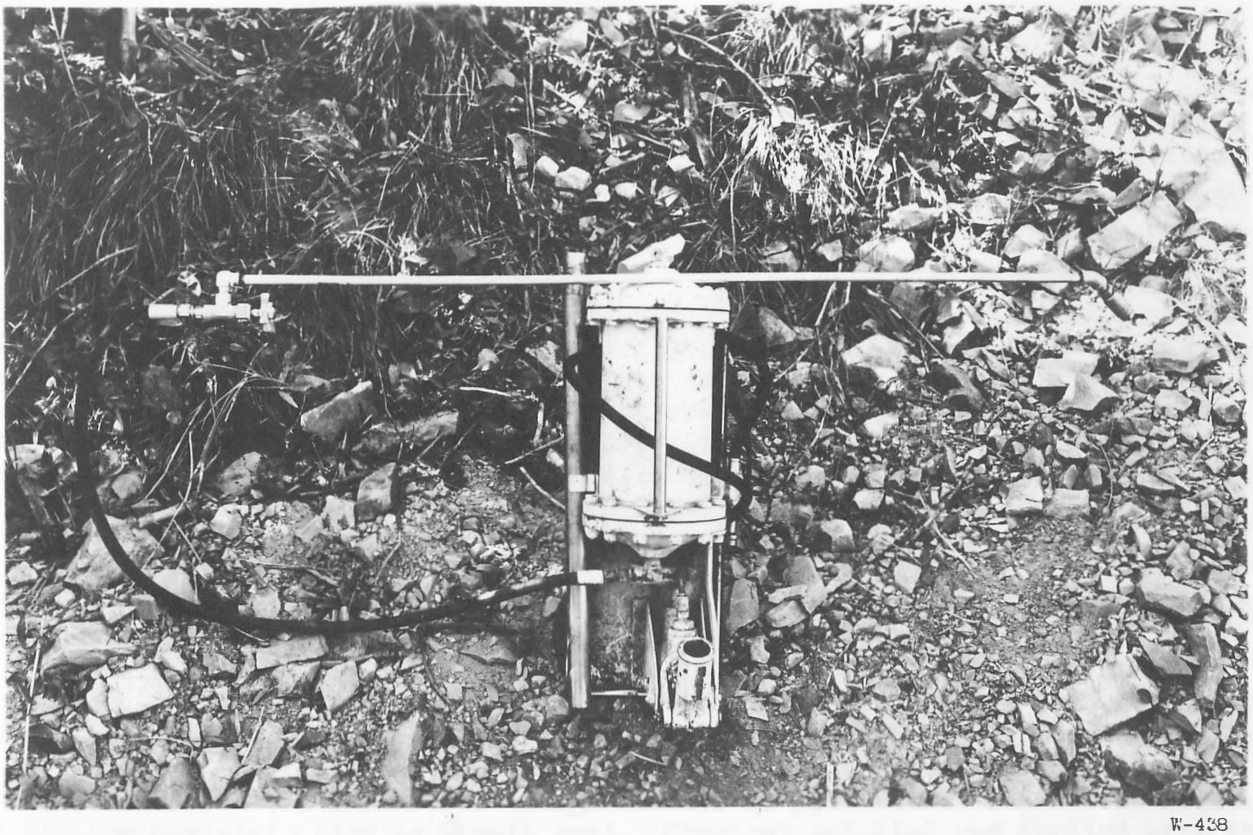
The two photographs in plate I show (W-438) the gun as finally equipped for ribes spraying, and (W-436) its operation in the treatment of a large R. viscosissimum bush with a mist type spray. A short galvanized pipe about 22 inches furnished by the manufacturer for extending the nozzle was replaced with one 36 inches long. This length was originally adapted for the chlorate and Ammate back pack trombone sprayers. To the end of the galvanized pipe extension was attached a 45 degree elbow mounting a new type of atomizing nozzle head. The angled mounting of the nozzle was found necessary for control of the mist spray down on a bush and upward over stems and under surface of leaves. Originally, mounting was direct to the straight extension. For the reason the mist spray is dispersed in cone-like fashion much solution will be wasted unless the nozzle is angled to deliver perpendicular to surfaces treated. Such mounting will materially reduce the difficulty of controlling the mist spray in wind.

Various size nozzle heads of the atomizing type were tested including numbers .60, 1, 2, 3, and 4 on the Hi-Fog gun. These numbers are those used by Spraying Systems Company of 4021 West Lake Street, Chicago, Illinois, and are catalog symbols of atomizing nozzles of 0.016, 0.020, 0.023, and 0.042 inches diameter of orifice. The number .60 (0.016 inches orifice) produced the best operational record on the basis of obtaining thorough spray coverage with a minimum of chemical solution. It was found that oil solutions of hormone sprays were easier to apply and would treat about twice the number of ribes bushes as an equal volume of water spray. The advantage of a light oil such as kerosene or fuel oil as a diluent for concentrates of hormone sprays is its low surface tension and low rate of evaporation as compared to water.

A 2-gallon compressed air sprayer mounting two separate cylinder tanks of equal size on a pack board was an object of study in comparison to the operation of the Hi-Fog gun. This two-cylinder unit, besides being about twice the weight of the Hi-Fog gun, dispersed 2 gallons of solution in less time than it took to effectively apply a 3-3/5-pint charge with the fog gun. Solution was placed in one of the cylinders and compressed air in the other. Air entered the top of the liquid cylinder forcing solution out around 25 pounds pressure at the bottom. The type of nozzle mounted delivered solution in a fan-shaped fashion. The unit had no practical value for spray work in this region in comparative tests with the Hi-Fog gun.

To simplify the presentation of chemical spray and dust tests, separate tables are given for work on each of the four North Idaho forests. The discussion

PLATE I



W-438

Hi-Fog gun showing cylinder of 3 pint capacity, hydraulic pump, and solution intake hose. Pump handle is carried left of cylinder. 350 lb. nitrogen charge is located in cylinder top. Pressure of gun when fully charged is 1,000 lbs. Pipe extension for nozzle is 1/8-inch diameter and 36 inches long. 45 degree elbow on pipe mounts atomizing nozzle head. Weight of empty gun is 26½ lbs.

W-436

Hi-fog gun in operation showing position carried on back and how nozzle extension is held to direct mist spray over bush. Spray is being dispersed through a number .60 atomizing nozzle head.

commences with the work on the Clearwater Forest, table 4, and progresses northward with the St. Joe studies presented in table 5, Coeur d'Alene in table 6, and the Kaniksu in table 7. Decapitation tests for all forests are presented separately in table 8.

Clearwater Chemical Tests

Chemical spray and dust tests on the Clearwater Forest were initiated June 24 and 25. Fourteen plots were treated with various 2,4-D formulations during the two days. On July 21 and 22 fifteen plots were established using a salt and an ester of 2,4,5-T and an ester of 2,4-D in spray tests. Two plots were dust treated on July 25. On August 8 one plot each of the salt and the ester of 2,4,5-T in proportions of 1 to 4 of a diluent were treated as representative of late season hormone work. Table 4 summarizes all important data relative to chemical tests this season on the Clearwater Forest.

Plots 1 to 4 represent a series of tests with the ammonium salt of 2,4-D used in connection with King's formula. Glycerol in the amount of 6 ml. was added to the 1 gallon of 2,000 p.p.m. of ammonium salt solution for plot 1. Potassium chloride, ammonium phosphate and glycerol were included with 2,4-D in the amounts shown in the table for plots 2 and 4. Plot 3 was treated with the ammonium salt as a check on the inclusion of other chemicals. Ribes selected for treatment were mature fruiting bushes with large amounts of live stem. Plots were located along the Shanghai Ridge to Summit road. Chemical solution was applied with the knapsack sprayer. Along with these four spray plots a fifth was established using a 15 per cent sodium dust of 2,4-D. Air temperature on June 24 was in the upper seventies with scattered clouds but no showers during the day.

The June 25 series of nine plots was established along Hildebrand Creek about 1 mile upstream from Blister Rust Control Headquarters camp. These plots represented tests to determine whether the herbicidal action of the sodium salt of 2,4-D is increased by the addition of onion extract. Onion extract was added in the proportion of 1 to 20 for plots 7, 10, and 12, and in the proportion of 1 to 30 for plots 6, 9, and 13. Plots 8, 11, and 14 are checks on concentrations of 2,4-D. Size of plots was 1 milacre. The 1 gallon of solution per plot was applied with the knapsack sprayer. Average age of ribes on the fairly recent Hildebrand cutting was three years. Air temperature during the period of applying spray solution was in the upper seventies. A few scattered clouds were present in the forenoon. By midafternoon large thunderheads were developing. A light sprinkle fell about 3 hours after completing the spray work.

Plots 15 through 29 were established in Mutton Gulch on July 21 and 22. Five plots each of the three chemical formulations, the amine salt of 2,4,5-trichlorophenoxyacetic acid, the ethyl ester of 2,4,5-T, and a methyl ester of 2,4-D were used in the tests. Each formulation was added to a diluent in the proportions of 1:2, 1:4, 1:9, 1:19, and 1:39. The diluent for the amine salt of 2,4,5-T was water. The diluent for the ethyl ester of 2,4,5-T and the methyl ester of 2,4-D was kerosene. Solution was applied with the Hi-Fog gun mounting a number 1 nozzle. Plots were approximately 2 chains long and ¼ chain wide. Average age of ribes was 5 years. None had developed to the point of producing seed. Method of treatment was selective for those bushes readily seen and broadcast of screened

habitats with known ribes present. For reasons of the latter technique ribes count as recorded may be slightly under actual numbers present although an effort was made to record all bushes however small. Air temperature during application was in the mid-eighties with skies clear.

Two dust plots, numbers 30 and 31, were established in Mutton Gulch on July 25. A 5 per cent isopropyl ester dust of 2,4-D was employed for this work. A small inexpensive type of garden duster was used for applying the isopropyl ester. Ribes on plot 30 averaged 6 years of age and on plot 31, 4 years of age. Fruit was being produced by ribes on plot 30 but none by ribes on plot 31. Air temperature during application was in the upper eighties with skies clear. Dust clung to the leaves of R. viscosissimum much better than to the slick surface of R. lacustre.

For tests representing late season hormone work, plots 32 and 33 were established in Mutton Gulch on August 8. In order to obtain a practical test in applying 2,4,5-T with the Hi-Fog gun, M. C. Riley, Operation Supervisor of the Clearwater Forest, agreed to provide two ordinary laborers for this job. These men had about 1 month of experience in using the Hi-Fog gun before being assigned to the plot work. Area of each plot was one-half acre subdivided into 6 strips, 3-1/3 chains long by 1 rod wide. Actual spray time for plot 32 was .65 man-days per acre and .50 man-days per acre for plot 33. Spray solution was applied selectively to the larger bushes which required little or no searching time. In cases where one or more small bushes were observed giving evidence that others might be present, the ribes habitat under suspicion was treated broadcast. The ethyl ester of 2,4,5-T in the proportion of 1 to 4 of the diluent kerosene was used for treatment of plot 32. The amine salt of 2,4,5-T in the proportion of 1 to 4 of the diluent water was applied to plot 33. Average age of ribes on the two plots was 5 years. Current year's growth development had been completed with a few basal leaves commencing to color at the date of treatment. Late September examination of these two plots showed evidence that spray coverage had not been thorough in the treatment of larger bushes.

TABLE 4

1947 CHEMICAL SPRAY AND DUST TESTS OF HORMONE FORMULATIONS
ON RIBES, CLEARWATER NATIONAL FOREST

Plot No. & Date Treated		Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. spray Solu.	Ribes Species					
							vis.		lac.		pet.	
							No. Bu.	FLS	No. Bu.	FLS	No. Bu.	FLS
6/24	1	Ammonium, 2,4-D + 6 ml. glycerol	Water	9.75 grams	2,000	1	9	235	2	115		
	2	2,4-D + potassium chloride ammonium phosphate & 6 ml. glycerol		9.75 7.56 11.34	2,000 2,000 3,000	1	7	380	5	325	1	6
	3	2,4-D		9.75	2,000	1	3	65	2	340		
	4	2,4-D + potassium chloride ammonium phosphate & 3 ml. glycerol		4.88 3.78 5.67	1,000 1,000 1,500	1	19	370	2	35		
	5	Dust - 15% sodium, 2,4-D	Frianite + Acid				4	110	1	50		
6/25	6	Sodium, 2,4-D	Water	1:30	10,000	1			20	35		
	7		plus	1:20	2,000	1			30	18		
	8		Onion		5,000	1			15	17	1	1
	9		Extract	1:30	5,000	1			27	15	1	1
	10			1:20	5,000	1			12	12	2	1
	11				2,000	1			12	5		
	12			1:20	10,000	1			9	29		
	13			1:30	2,000	1			41	17		
	14				10,000	1			24	12		
7/21	15	Amine salt of 2,4,5-trichlorophenoxyacetic	Water	1:2	37,000	.375	1	6	95	120	1	1
	16			1:4	22,000	.375			36	200		
	17			1:9	11,100	.375			70	170		
	18			1:19	5,500	.375			55	150		
	19			1:39	2,250	.375			88	190		
	20	Ethyl Ester 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:2	41,667	.375	2	23	44	118		
	21			1:4	25,000	.375			42	195		
	22			1:9	12,500	.375			34	150		
	23			1:19	6,250	.375			37	63	1	2
	24			1:39	3,125	.375			48	192		
7/22	25	Methyl Ester 2,4-D	Kerosene	1:2	38,667	.375			64	157	1	1
	26			1:4	23,200	.375	4	7	57	122		
	27			1:9	11,600	.375	1	1	42	40		
	28			1:19	5,800	.375	1	1	30	62		
	29			1:39	2,900	.375			27	175		
7/25	30	Dust - 5% isopropyl ester 2,4-D				1¼#	38	494	1	1		
	31					1½#	29	42	26	23	1	2
8/8	32	Ethyl Ester 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:4	25,000	.81	69	103	425			
	33	Amine salt of 2,4,5-trichlorophenoxyacetic	Water	1:4	22,000	.69	79	115	309		1	1

St. Joe Chemical Tests

Chemical tests were started on the St. Joe National Forest June 17 and carried through August 18. Ten plots were established June 17, nine being spray plots and the tenth a dust plot. On July 15 and 16 a series of 21 plots was treated. Plots numbering 11 through 19 in table 5 represented tests to determine whether herbicidal action of the salt of 2,4-D is increased by the addition of onion extract. Plots numbering 20 through 23 are the King's formula series of ammonium salt tests with the inclusion of other chemicals with 2,4-D. Plots numbering 24 through 31 are the series of 2,4,5-trichlorophenoxyacetic acid tests. These tests were replicated August 18 with the establishment of plots 32 through 46.

Plots 1 to 10 established June 17 were located along the Marble Creek road in the Corbett Creek drainage. Onion extract was added in the proportion of 1 to 20 of water for treatment of plots 1, 6, and 7. The proportion of 1 to 30 was used in treating plots 2, 3, and 4. Plots 5, 8, and 9 are chemical concentration checks of the sodium salt of 2,4-D. Each plot was 1 milacre in size. Solution was applied with the knapsack sprayer at the rate of 1 gallon per milacre except the .4 gallon treatment of plot 1. Plot number 10 was treated with a 5 per cent sodium dust of 2,4-D. Ribes were mature fruiting bushes with large amounts of live stem. Air temperature was in the lower seventies with considerable cloudiness from a rain storm preceding by a day or two the treatment of plots. Both air humidity and soil moisture were high.

The sodium salt of 2,4-D and onion extract tests were replicated in the Corbett Creek drainage July 15. These midseason tests are represented by plots 11 through 19. Age of ribes, plot size, and spray methods were identical to the June 17 tests. The only difference was that ribes were fully foliated with fruits mature and commencing to color at the July 15 date. Air temperature was in the lower eighties with skies clear. Plots 20 through 23 were established the same date in the Corbett Creek drainage. King's formula of the ammonium salt of 2,4-D with the addition of potassium chloride, ammonium phosphate and glycerol was used in these tests. Spray solution was applied at a dosage of 1 gallon per milacre with the knapsack sprayer.

On July 16 the first of the 2,4,5-T tests was made on the St. Joe Forest. For plots 24 through 27 the salt of 2,4,5-T was applied in proportions of 1:2, 1:4, 1:9, and 1:19 with water as a diluent. Plots 28 through 31 were treated with the ethyl ester of 2,4,5-T with kerosene as the diluent. Size of plots was 1 milacre. Plots were located along the Middle Fork of the St. Maries River near the mouth of Filer Creek. Solution was applied with the Hi-Fog gun mounting a number 1 atomizing nozzle head. Ribes were of mature age, fully foliated with fruits commencing to color. Air temperature was in the upper eighties. Sky was clear. Summer showers had preceded plot treatment by about 30 hours.

To represent late season applications of 2,4,5-T, plots 32 through 46 were established August 18. These were located in the Middle Fork drainage of the St. Maries River alongside the July 16 plots near the mouth of Filer Creek. Plots 32 through 36 were treated with the salt of 2,4,5-T with water as a diluent. Plots 37 through 41 were treated with the ethyl ester of 2,4,5-T with kerosene as a diluent. Plots 42 through 46 were also treated with the ethyl ester of 2,4,5-T with fuel oil as a diluent instead of kerosene. Solution was applied with the

Hi-Fog gun mounting the number 1 nozzle head. Size of plots was 1 milacre. Air temperature was around 85 degrees Fahrenheit with nights beginning to cool. Ribes were of a mature age and fully developed for the season. Fruits were ripe and commencing to fall. Fuel oil was considered equally as good as kerosene for a diluent of the ethyl ester of 2,4,5-T.

TABLE 5

1947 CHEMICAL SPRAY AND DUST TESTS OF HORMONE FORMULATIONS ON RIBES, ST. JOE NATIONAL FOREST

Plot No. & Date Treated		Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species: vis. No. Bu.	vis. FLS	lac. No. Bu.	lac. FLS	pet. No. Bu.	pet. FLS
6/17	1	Sodium, 2,4-D	Water	1:20	2,000	.40	14	125				
	2		plus	1:30	1,000	1	21	95				
	3		Onion	1:30	2,000	1	19	225				
	4		Extract	1:30	5,000	1	33	185				
	5			Check	2,000	1	8	115				
	6			1:20	1,000	1	8	200				
	7			1:20	5,000	1	19	115				
	8			Check	1,000	1	16	80				
	9			Check	5,000	1	56	165				
	10	Dust, 5% Na. 2,4-D	Frianite	1:19			9	153				
7/15	11	Sodium, 2,4-D	Water	1:20	1,000	1	5	80				
	12		plus	1:20	2,000	1	3	135				
	13		Onion	1:20	5,000	1	13	185				
	14		Extract	1:30	1,000	1	11	220				
	15			1:30	2,000	1	3	120				
	16			1:30	5,000	1	8	350				
	17			Check	1,000	1	8	230				
	18			Check	2,000	1	7	100				
	19			Check	5,000	1	28	150	2	5		
	20	Ammonium, 2,4-D + potassium chloride ammonium phosphate & 3 ml. glycerol	Water	4.88 3.78 5.67 grams	1,000 1,000 1,500	1	17	120				
	21	2,4-D + potassium chloride ammonium phosphate & 6 ml. glycerol		9.75 7.56 11.34	2,000 2,000 3,000	1	12	110	1	4		
	22	2,4-D		9.75	2,000	1	11	130				
	23	2,4-D + 6 ml. glycerol		9.75	2,000	1	15	200	2	40		
7/16	24	Amine salt of 2,4,5-trichlorophenoxyacetic	Water	1:2	37,000	.05			4	120		
	25			1:4	22,000	.07			6	170		
	26			1:9	11,100	.11			8	300		
	27			1:19	5,550	.09			10	100		

(continued on following page)

TABLE 5 (continued)

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species: vis. No. Bu.	vis. FLS	lac. No. Bu.	lac. FLS	pet. No. Bu.	pet. FLS
7/16 28	Ethyl ester 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:2	41,667	.07			4	230		
29			1:4	25,000	.09			4	350		
30			1:9	12,500	.12			1	350		
31			1:19	6,250	.11			2	300		
8/18 32	Amine salt of 2,4,5-trichlorophenoxyacetic	Water	1:2	37,000	.08			4	180		
33			1:4	22,000	.07			3	120		
34			1:9	11,100	.08			3	190	1	25
35			1:19	5,550	.11			3	230		
36			1:39	2,250	.06			1	160		
37	Ethyl ester 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:2	41,667	.16			9	280		
38			1:4	25,000	.07			1	150		
39			1:9	12,500	.12			5	250		
40			1:19	6,250	.14			6	200		
41			1:39	3,125	.12			4	150	2	13
42		Fuel Oil	1:2	41,667	.07			4	130		
43			1:4	25,000	.10			5	110		
44			1:9	12,500	.08			3	70		
45			1:19	6,250	.15			9	100		
46			1:39	3,125	.12			6	180		

Coeur d'Alene Chemical Tests

Initial tests with 2,4,5-T in the region were made on this forest commencing July 8. On this date eight plots were established in the Potter Creek drainage about one-half mile above the Forest Service brush camp. Ribes were 6 and 7 years of age originating on a 1941 cutting. Size of plots was 1 milacre wide and approximately $1\frac{1}{4}$ chains long. Plots 1 through 4 were treated with the amine salt of 2,4,5-T in the proportions 1:2, 1:4, 1:9, and 1:19 with the diluent water. Plots 5 to 8 were treated with the ethyl ester of 2,4,5-T with kerosene as a diluent. Solution was applied with the Hi-Fog gun mounting a number 1 atomizing nozzle head. Ribes were fully foliated with fruits mature but green. Air temperature was in the upper seventies with skies clear. As these plots were located on upland bordering stream type the moist habitat was occupied by the single species R. lacustre.

The July 8 tests were replicated by the establishment of a second series of plots July 15. Anhydrous sodium carbonate was added to the acid of 2,4,5-T to make the salt for treatment of plots 9 through 13. The concentration of parent acid employed was 1, 2, 3, and 5,000 p.p.m. Onion extract was added in the proportion of 1 to 20 for treatment of one of the two 2,000 p.p.m. tests. Solution was applied with the knapsack sprayer. Size of plots was 1 milacre. One gallon of solution was applied as an aerial and soil drench per plot. Plots are located on the uphill side of the main Potter Creek haul-out road about $1\frac{1}{2}$ miles out from the Potter-Stewart Creek divide road. Average age of ribes is 6 years. They were fully foliated at the July 15 date with fruits mature and commencing to color.

Air temperature was in the upper seventies with a summer shower during the forenoon of the previous day. The onion extract was prepared by methods discussed under general summarization at the beginning of this section.

On the same date July 15, eight R. viscosissimum plots were treated, four with the ethyl ester of 2,4,5-T and four with the methyl ester of 2,4-D. The diluent in both cases was kerosene. These plots were located near the top of the Potter-Stewart Creek divide about one-third mile out on logging road No. 1. For the reason ribes were selectively treated, plot size varies from one-tenth to one-fifth acre depending upon the number of bushes sprayed with the full 3-3/5 pint charge of the Hi-Fog gun. Average age of ribes was 6 years. Bushes were fully foliated with fruit mature and commencing to show slight coloring. Photo W-452, plate V shows the condition of R. viscosissimum bushes 51 days after treatment. Bushes in the immediate foreground were treated with the ethyl ester of 2,4,5-T in the proportion of 1 to 4 of the diluent kerosene. Heavy concentration of ribes in skid trail is a result of mechanical disturbance of the forest floor by log skidding with a caterpillar.

The last three days in July were devoted to the treatment of nineteen spray plots and one dust plot. The ethyl ester of 2,4,5-T in kerosene was applied to plots 22 through 26. Plots 27 through 31 were treated with the methyl ester of 2,4-D in kerosene. The amine salt of 2,4,5-trichlorophenoxyacetic acid was applied to plots 32 through 36. A five per cent isopropyl ester dust of 2,4-D was used to treat plot 37. Two spray mist drift plots were included in this series of tests. Plot 38 was treated with the methyl ester of 2,4-D and plot 39 with the ethyl ester of 2,4,5-T. All plots are located on the uphill side of logging road No. 1 except two below road, and are about 1 mile out from the junction of the Potter-Stewart Creek main haul-out road. Size of plots varies from one-fifth to two-fifths acres depending upon the number of ribes treated with two full charges, 7-1/5 pints, of the Hi-Fog gun. Ribes were fully foliated with fruits of R. lacustre ripe and those of R. viscosissimum within 10 days of being ripe. Average age of ribes was 6 years. Air temperature during the 3 days was in the lower eighties with skies clear.

A number of photographs are presented to show stages of injury from hormone sprays. Plate II illustrates the rapidity of chemical injury 24 hours after treatment. The R. lacustre bush in W-477 was treated the previous day with the ethyl ester of 2,4,5-T at 1 to 4 of kerosene. The R. lacustre bush in W-473 was treated with the methyl ester of 2,4-D at a ratio of 1 to 4 of kerosene. Injury by the latter chemical in 24 hours is much faster than with 2,4,5-T. Foliage of both bushes is typical of injury from these hormones the day of treatment or by the following day.

Plate III and the top photo on plate IV show typical condition of bushes treated with 2,4,5-T about 5 weeks after application. The R. viscosissimum bush in W-475, plate III, was treated with the ethyl ester of 2,4,5-T in the proportion of 1 to 4 of kerosene on July 29. All live stem was dead but cambium was green in root crown September 4, the date the picture was taken. In W-474, a clump of R. lacustre treated with the ethyl ester of 2,4,5-T in the proportion of 1 to 2 parts of kerosene can be observed along side of logs. This clump was treated July 29 and the picture taken September 4. All live stem was dead at the latter date but cambium in root crowns and a short distance up basal stems was green.

No resprouts had appeared at the September date or by the 22nd of October. Photo W-476 on plate IV shows a R. lacustre bush sprayed with the amine salt of 2,4,5-trichlorophenoxyacetic acid on July 30 and its condition September 4. The proportion of 2,4,5-T to water was 1 to 4 for treatment of this bush. Injury is very slow. Leaves begin to take on fall colors about the third week after treatment. Green color in cambium gradually fades to a yellow-brown as live stem begins to die toward the root crown. At no time during the season of treatment was there any indication that death might result from applying the salt of 2,4,5-T in aqueous solution.

To answer the question whether a mist spray can be drifted onto a bush with favorable results one has only to glance at photo W-461 for the answer. Plots 38 and 39 represent treatments in which mist spray was drifted over ribes bushes with the Hi-Fog gun. The two plots were established along a road bank so it was possible to walk along above them and get the mist to carry down slope. The bush in the picture is typical of spot injury resulting from incomplete coverage with spray solution. Healthy leaves can be seen at the tops of some stems as well as throughout the aerial crown. This type of treatment from the ground results in a hit and miss proposition and cannot be depended upon in the application of hormone sprays. No bush kill will be obtained unless stems and leaves are thoroughly covered with spray solution.

Low concentration of parent acid results in about the same bush condition as incomplete coverage with spray solution. Photo W-481 on plate V shows the status of a number of R. viscosissimum bushes the fifth week after being sprayed with the ethyl ester of 2,4,5-T in the proportion of 1 to 19 of kerosene. Leaves from some of the live stem have fallen but others remain on the plants with varying degrees of injury. These bushes treated with low chemical concentration appear much as the bush in photo W-461 treated with a mist concentrate by wind drifting solution onto the bush.

To complete the July 29 to 31 series of tests, two plots were established in a stream bottom for the treatment of R. lacustre on a moist habitat. These two plots are located at the junction of logging road No. 5 and the main Potter Creek road about 1½ miles below the Ohio Match Logging Camp No. 40. Plot 40 was treated with the methyl ester of 2,4-D and plot 41 with the ethyl ester of 2,4,5-T. The chemical concentration for both plots was 1 to 4 parts of kerosene. Average age of ribes was 5 years. Air temperature was in the upper eighties and skies were clear. An October inspection of these plots showed resprouting from the 2,4-D treatment but none from the application of 2,4,5-T.

A series of late season tests on the Coeur d'Alene Forest is represented by plots 42 through 45. These were established September 3 in the same location as the July 29 to 31 series. Plots 42 and 43 were treated with the ethyl ester of 2,4,5-T in proportion of 1:2, and 1:4 with kerosene. The methyl ester of 2,4-D in identical proportions as the above with kerosene was applied to plots 44 and 45. Stronger chemical concentrations were the only strengths replicated because of the rapidly approaching fall season. Ribes were beginning to drop lower leaves. All fruit had fallen two to three weeks prior to chemical treatment. Air temperature had dropped to the lower seventies. Skies were clear on the day of treatment. Night temperature was in the higher thirties with frost appearing in meadows along streams.

PLATE II

W-477

Ribes lacustre bush showing chemical injury 24 hours after treatment with ethyl ester of 2,4,5-T in kerosene at 1:2. Date of application, September 3, 1947.

W-473

Ribes lacustre bush showing chemical injury 24 hours after treatment with methyl ester of 2,4-D in kerosene at 1:2. Date of application, September 3, 1947.

PLATE III

W-475

Ribes viscosissimum bush 38 days after treatment with the ethyl ester of 2,4,5-T in kerosene at 1:4. Date of application July 29. Live stem is dead to root crown, no resprouting season of treatment.

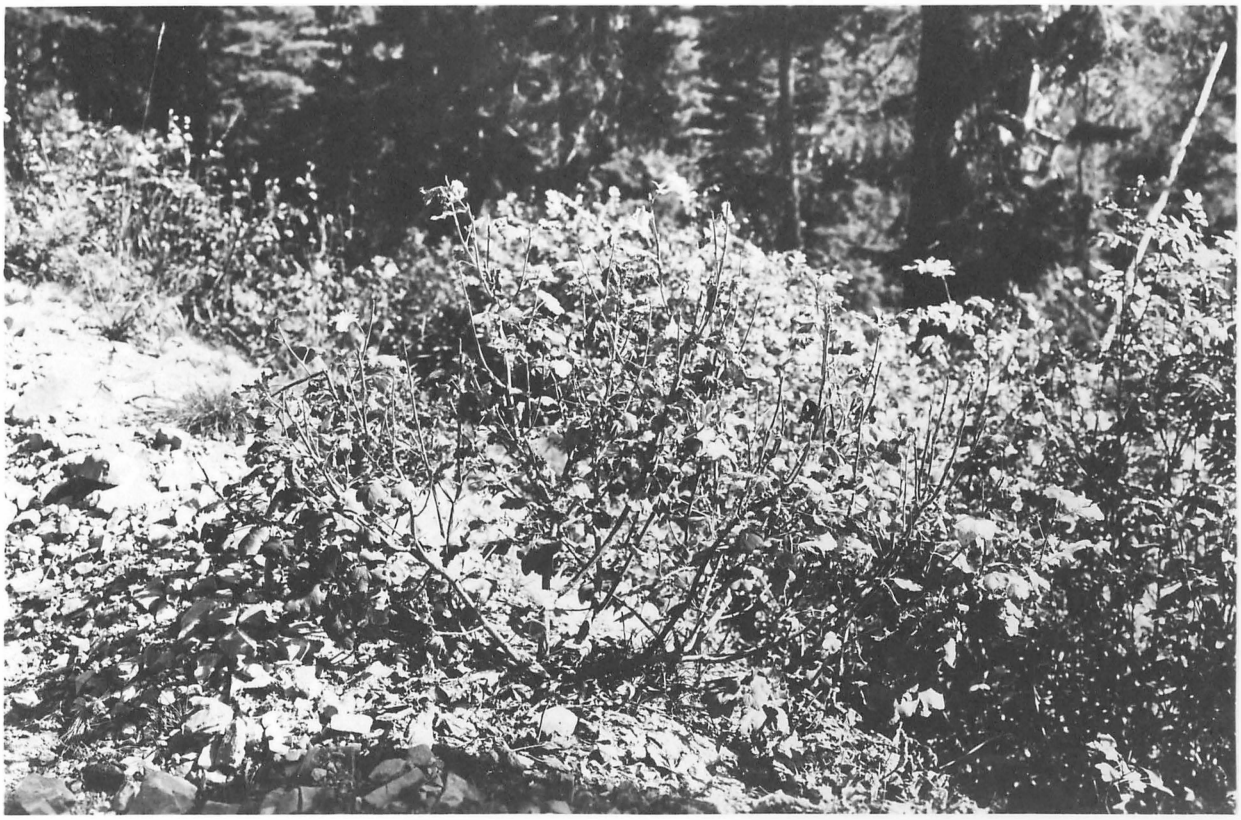
W-474

A clump of R. lacustre along logs 38 days after treatment with the ethyl ester of 2,4,5-T in kerosene at 1:2. Date of application, July 29, 1947. Live stem dead to root crown, no resprouting season of treatment.

PLATE IV

W-476

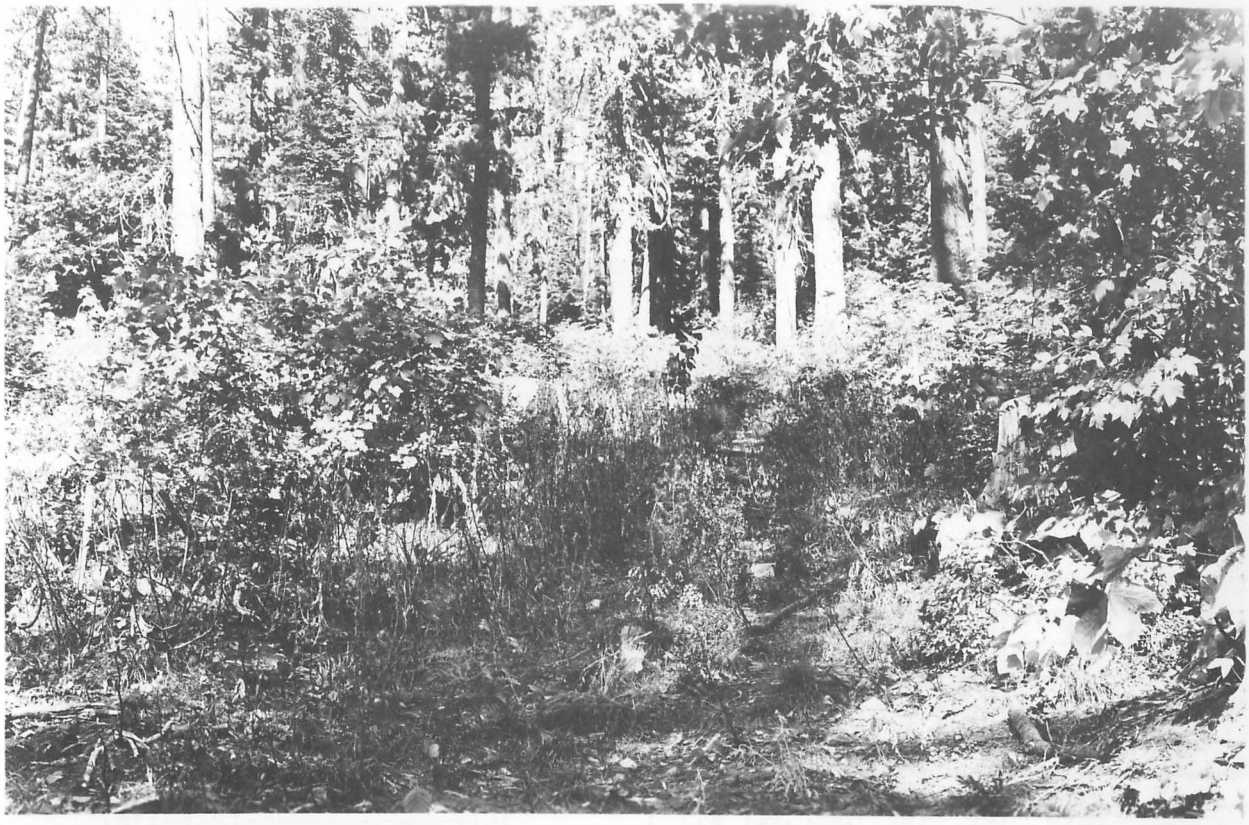
Ribes lacustre bush 36 days after treatment with amine salt of 2,4,5-T acid in water at 1:4. Date of application, July 31, 1947. Stem and crown cambium discolored and spongy but still functioning, no resprouting season of treatment.



W-461

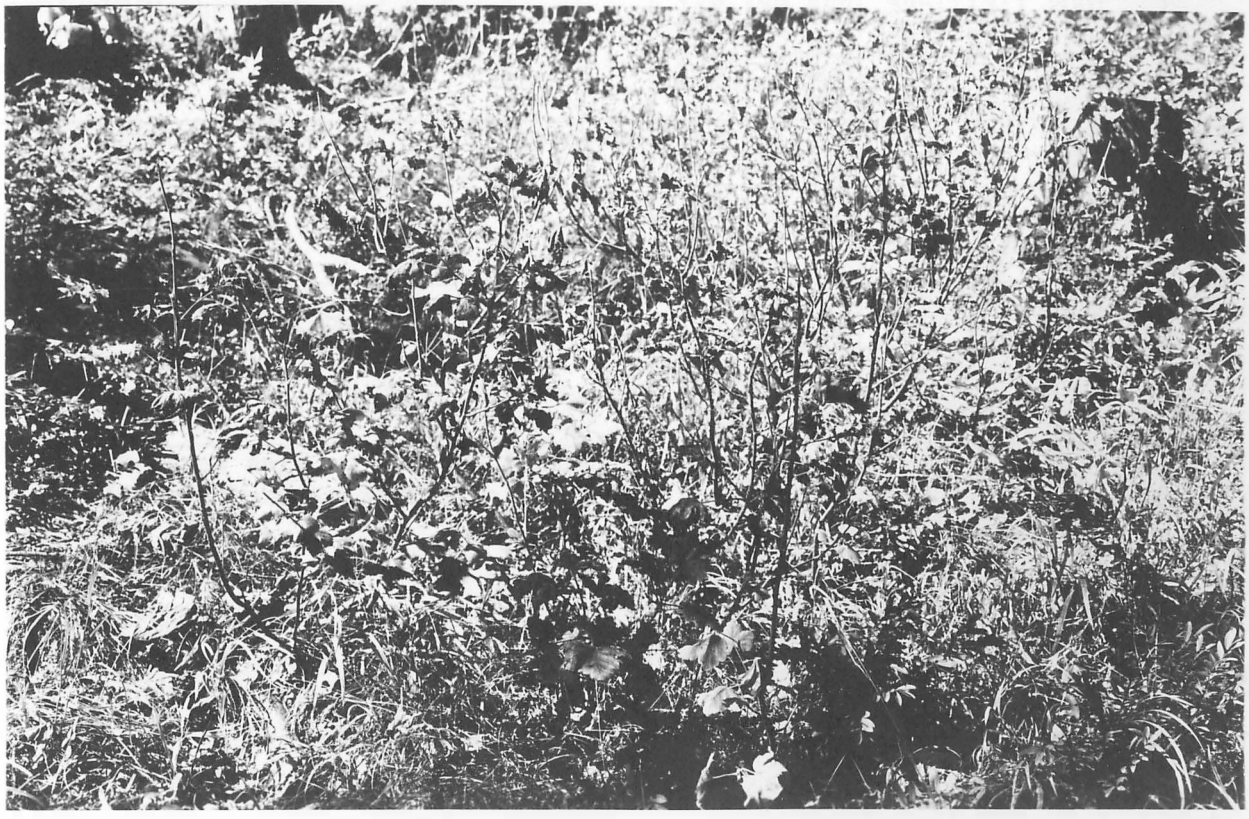
Ribes viscosissimum bush 38 days after treatment showing effects of incomplete spray coverage resulting from an attempt to drift chemical solution as a mist onto the bush from about 4 feet distance. Bush treated with the ethyl ester of 2,4,5-T in kerosene at 1:4. Date of application, July 29, 1947. Leaves and live stem affected only where thorough coverage was obtained in drifting mist spray onto the bush.

PLATE V



W-452

A concentration of R. viscosissimum on skid trail 51 days after treatment with the ethyl ester of 2,4,5-T in kerosene. Chemical concentration in lower foreground 1:4 and upper foreground 1:9. Date of application, July 15, 1947. All live stem in 1:4 treatment dead to root crown, no resprouting season of treatment.



W-481

A concentration of R. viscosissimum in skid trail 38 days after treatment with the ethyl ester of 2,4,5-T in kerosene at 1:19. Bushes show incomplete live stem kill resulting from using too low a chemical concentration for July 29, 1947 treatment. Typical of all 2,4,5-T tests, no resprouting occurred the season of treatment.

TABLE 6

1947 CHEMICAL SPRAY AND DUST TESTS OF HORMONE FORMULATIONS ON RIBES, COEUR D'ALENE NATIONAL FOREST

Plot No. & Date Treated		Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species vis. No. Bu.	vis. FLS	lac. No. Bu.	lac. FLS
7/8	1	Amine salt of 2,4,5-trichlorophenoxyacetic	Water	1:2	37,000	.19			45	120
	2			1:4	22,200	.20			50	48
	3			1:9	11,100	.16			65	168
	4			1:19	5,550	.16			17	30
	5	Ethyl ester of 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:2	41,667	.19			7	14
	6			1:4	25,000	.20			41	32
	7			1:9	12,500	.16			63	78
	8			1:19	6,250	.23			122	177
7/15	9	Sodium salt of 2,4,5-trichlorophenoxyacetic	Water		1,000	1	5	40	22	360
	10				2,000	1	9	16	25	52
	11			1:20	2,000	1	3	90	13	98
	12				3,000	1	10	150	10	78
	13				5,000	1	2	18	17	78
	14	Ethyl ester of 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:2	41,667	.375	92	610		
	15			1:4	25,000	.375	95	775		
	16			1:9	12,500	.375	86	1,380		
	17			1:19	6,250	.375	104	1,020		
	18	Methyl ester of 2,4-dichlorophenoxyacetic acid		1:2	38,667	.375	113	1,200		
	19			1:4	23,200	.375	127	1,025		
	20			1:9	11,600	.375	121	985		
	21			1:19	5,800	.375	104	925		
7/29	22	Ethyl ester of 2,4,5-trichlorophenoxyacetic acid	Kerosene	1:2	41,650	.75	16	28	87	1,985
	23			1:4	25,000	.75	67	385	113	1,740
	24			1:9	12,500	.75	93	385	68	1,030
	25			1:19	6,250	.75	112	470	22	355
	26			1:39	3,125	.75	103	395	27	320
	27	Methyl ester of 2,4-dichlorophenoxyacetic acid		1:2	38,667	.75	104	415	47	670
	28			1:4	23,200	.75	96	365	39	410
	29			1:9	11,600	.75	113	590	31	385
	30			1:19	5,800	.75	101	565	37	425
	31			1:39	2,900	.75	94	510	22	335
7/30	32	Amine salt of 2,4,5-trichlorophenoxyacetic	Water	1:2	37,000	.75	107	715	51	735
	33			1:4	22,000	.75	112	760	36	480
	34			1:9	11,100	.75	102	690	39	465
	35			1:19	5,500	.75	95	735	23	290
	36			1:39	2,250	.75	109	805	17	185
	37	Dust - 5% isopropyl ester 2,4-D "Esteron"					44	210	58	885
	38	Methyl ester 2,4-D applied as drift spray	Kerosene	1:4	23,200	.375	64	335	31	415

(continued on following page)

TABLE 6 (continued)

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species			
						vis.		lac.	
						No. Bu.	FLS	No. Bu.	FLS
7/30 39	Ethyl ester 2,4,5-T applied as drift spray	Kerosene	1:4	25,000	.375	74	460	23	245
7/31 40	Methyl ester of 2,4-dichlorophenoxyacetic acid	Kerosene	1:4	23,200	.375			53	735
41	Ethyl ester of 2,4,5-trichlorophenoxyacetic acid		1:4	25,000	.375			47	690
9/3 42	Ethyl ester of 2,4,5-	Kerosene	1:2	41,667	.75	87	380	63	565
43	trichlorophenoxyacetic acid		1:4	25,000	.75	76	345	54	510
44	Methyl ester of 2,4-		1:2	38,667	.75	61	370	78	635
45	dichlorophenoxyacetic acid		1:4	23,200	.75	57	385	52	490

Kaniksu Chemical Tests

Tests on this forest were not initiated until August 6. All applications are to be considered as late season tests. Ribes leaves were beginning to develop a leathery texture and show spotting of fall colors. Fruiting was at a peak with the majority of berries dropping by August 20. Chemical spray plots 1 to 4 were established August 6, plots 5 to 8 on August 7, and plots 9 to 12 on August 12. These 12 plots represented the major series of tests being replicated on the 4 north Idaho forests. On August 14 plots 13 to 16 were established employing fuel oil as a diluent for the esters of 2,4,5-T and 2,4-D. A low stem type of treatment was employed the same date for plots 17 to 20. On August 18 two plots, 21 and 22, were treated with the butyl ester of 2,4-D in kerosene. On the same date plot 23 was established using the 2-gallon compressed air sprayer to apply the solution. Two R. inerme plots were established on August 19 in stream type. On August 25 four plots were established on a stream bench for the purpose of treating stream type R. lacustre. Plot records for the Kaniksu are shown in table 7.

Plots 1 to 4 were sprayed with the ethyl ester of 2,4,5-T in kerosene. Plots 5 to 8 were sprayed with the methyl ester of 2,4-D with kerosene as a diluent. The amine salt of 2,4,5-trichlorophenoxyacetic acid was used to treat plots 9 to 12. Again size of plot varied with the number of ribes bushes which could be treated with two full charges, 7-1/5 pints, of the Hi-Fog gun. Their size ranged from one-fifth to two-fifths acres. Plots were located at the head of the La Clerc Creek drainage. Average age of ribes was 7 years. Air temperature on the three days of plot treatment was in the lower eighties with skies mostly clear.

For plots 13, 14, 15, and 16, fuel oil was used as a diluent for the hormone sprays instead of kerosene. The ethyl ester of 2,4,5-T was applied to plots 13 and 14, and the methyl ester of 2,4-D to plots 15 and 16. Tests with fuel oil

were made to determine how satisfactory this cheaper product would be as a diluent in comparison to kerosene. The proportions of 1:4 and 1:9 were the only chemical concentrations employed in this test. Fuel oil proved to be just as good a diluent of chemical sprays as kerosene. In fact being slightly heavier than kerosene, the Hi-Fog mist was easier to control in wind.

Some success had been reported from California in limiting the application of chemical spray to the basal portions of stems. Plots 17 through 20 were thus established to determine the effectiveness of low stem treatment. Chemical spray was applied to a bush height of 1 foot. On smaller bushes many or all leaves were sprayed as no attempt was made to limit treatment entirely to stem growth. Those bushes which exceeded 1 foot in height growth were stem treated except for an occasional leaf within the zone of application. Plots 17 and 18 were treated with the ethyl ester of 2,4,5-T in kerosene and plots 19 and 20 with the methyl ester of 2,4-D in kerosene. Spray time involved in basal stem treatment was about half that required to cover leaves and stems.

As tests had never been undertaken in this region to determine the effectiveness of the butyl ester of 2,4-D in a diluent such as kerosene, two plots, 21 and 22, were established to obtain comparative results with previous tests of an aqueous solution. These two plots were treated August 18. On the same date plot 23 was established using the 2-gallon compressed air sprayer previously described to apply the chemical solution. Besides dispersing the 2 gallons in less time than the 3-3/5 pint charge of the Hi-Fog gun with a number .60 nozzle, it was found more difficult to obtain thorough coverage of leaves and stems with the compressed air sprayer than with the mist type spray of the Hi-Fog gun.

Plots 24 and 25 were established to obtain comparative tests of 2,4,5-T and 2,4-D in the treatment of stream type R. inerme. These plots and the four, 26 to 29, are located on Lamb Creek about one-half mile above the strawberry ranch. Plot 24 was treated with the ethyl ester of 2,4,5-T and plot 25 with the methyl ester of 2,4-D. The diluent for both chemicals was kerosene in the proportion of 1 part chemical concentrate to 4 parts of the diluent. Average age of ribes bushes in these stream type plots was 8 years. Bushes were open grown on area which had been bulldozed of all brush in the late thirties. Chemical solution was applied with the Hi-Fog gun which proved highly desirable for mop-up work in stream type. Air temperature was in the lower eighties with skies clear the day of treatment.

On a stream bench inhabited by stream type R. lacustre in the Lamb Creek drainage a short distance from the R. inerme tests, plots 26 to 29 were treated on August 25. These were established to check the comparative effectiveness of hormone sprays on upland and stream type R. lacustre. Plots 26 and 27 were treated with the ethyl ester of 2,4,5-T in kerosene and plots 28 and 29 with the methyl ester of 2,4-D. Average age of ribes on this stream bench was 6 years. All fruit had fallen and many of the lower stem leaves were commencing to turn fall colors at the date of plot treatment. Air temperature was in the upper seventies. Skies were partly cloudy. About 2 hours' rain had fallen the night of August 23.

TABLE 7

1947 CHEMICAL SPRAY TESTS OF HORMONE FORMULATIONS
ON RIBES, KANIKSU NATIONAL FOREST

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species: vis. No. Bu.	vis. FLS	lac. No. Bu.	lac. FLS	inerme No. Bu.	inerme FLS
8/6 1	Ethyl ester of	Kerosene	1:2	41,667	.75	263	1,125	37	195		
2	2,4,5-trichloro-		1:4	25,000	.75	237	1,080	26	162		
3	phenoxyacetic acid		1:9	12,500	.75	281	1,340	48	238		
4			1:19	6,250	.75	242	1,125	43	203		
8/7 5	Methyl ester of	Kerosene	1:2	38,667	.75	338	1,450	64	311		
6	2,4-dichloro-		1:4	23,200	.75	317	1,210	56	205		
7	phenoxyacetic acid		1:9	11,600	.75	342	1,380	69	318		
8			1:19	5,800	.75	263	1,065	44	200		
8/12 9	Amine salt of	Water	1:2	37,000	.75	187	990	51	320		
10	2,4,5-trichloro-		1:4	22,000	.75	213	1,045	77	380		
11	phenoxyacetic		1:9	11,100	.75	237	1,150	63	290		
12			1:19	5,500	.75	209	1,085	67	305		
8/14 13	Ethyl ester of	Fuel Oil	1:4	25,000	.75	233	1,175	41	238		
14	2,4,5-T acid		1:9	12,500	.75	288	1,130	55	278		
15	Methyl ester of		1:4	23,200	.75	261	1,015	47	220		
16	2,4-D acid		1:9	11,600	.75	217	985	38	193		
17	Ethyl ester of	Kerosene	1:4	25,000	.75	203	1,135	52	246		
18	2,4,5-trichloro-		1:9	12,500	.75	219	1,165	61	282		
	phenoxyacetic acid										
	(Low stem treatment)										
19	Methyl ester of		1:4	23,200	.75	264	1,260	73	310		
20	2,4-dichloro-		1:9	11,600	.75	292	1,415	87	362		
	phenoxyacetic acid										
	(Low stem treatment)										
8/18 21	Butyl ester of 2,4-	Kerosene	1:4	64,000	.75	248	1,235	107	416		
22	dichlorophenoxy-		1:9	32,000	.75	223	1,205	94	392		
	acetic acid										
23	Ethyl ester of		1:4	25,000	2.00	138	890	64	278		
	2,4,5-trichloro-										
	phenoxyacetic acid										
	(Compressed-air unit)										
8/19 24	Ethyl ester of	Kerosene	1:4	25,000	.75					93	560
	2,4-dichloro-										
	phenoxyacetic acid										
25	Methyl ester of		1:4	23,200	.75					87	535
	2,4-dichloro-										
	phenoxyacetic acid										
8/25 26	Ethyl ester of	Kerosene	1:4	25,000	.75			81	735		
27	2,4,5-trichloro-		1:9	12,500	.75			76	710		
	phenoxyacetic acid										
28	Methyl ester of		1:4	23,200	.75			87	955		
29	2,4-dichloro-		1:9	11,600	.75			94	920		
	phenoxyacetic acid										

Ribes Decapitation Tests

Prior to the 1947 field season Ammate had been used in ribes decapitation work for the treatment of cut stem and root surfaces. One of its disadvantages is that large amounts must be carried for a day's work. It was found that a liquid concentrate of 2,4-D was as effective as Ammate and could be carried in a small oil can in the hip pocket. This chemical was thus adopted by the control operations in 1947 for treatment of cut stem and root surfaces in the decapitation of ribes.

Decapitation tests were expanded this past season to determine (1) the relationship between chemical concentration and bush kill, and (2) location of cut and treated surface in respect to stem height above root crown and bush kill. A 40 per cent butyl ester of 2,4-D diluted to 5, 10, and 20 per cent concentrations in water was used in these tests. Types of cut surfaces made in decapitating aerial portions of ribes were (1) cut made directly through crown, (2) stems cut 1 inch above crown, (3) stems cut 2 inches above crown, and for treatment of R. viscosissimum (4) stems cut 3 inches above crown. To each cut surface a few drops of the liquid 2,4-D concentrate were applied through the snout of the oil can. Data for the 28 ribes decapitation plots are shown in table 8.

Plots 1 to 16 on the Coeur d'Alene Forest were the first series of decapitation tests established in the region. These are located on the uphill side of logging road No. 1 about one-half mile out from the Potter-Stewart Creek main divide road. They are in the vicinity of the Potter Creek spray plots. Average age of ribes for these tests was 7 years. The decapitation series was represented by treatment with three chemical concentrations and a check on location of cut surface in respect to stem height above root crown. Ribes were fully foliated at the July 14 date of treatment. Fruits were mature and commencing to show some ripening color. Bushes were decapitated with hand pruners. The single species R. viscosissimum was the only one included in these tests.

To obtain similar tests with R. lacustre a series of decapitation plots was established on the St. Joe Forest. These are located near the mouth of Filer Creek, a tributary of the Middle Fork of the St. Maries River. Bushes were 6 to 8 years of age. The three concentrations of butyl ester of 2,4-D were employed for treatment of cut stem surfaces. Height of cut was identical to the R. viscosissimum plots on the Coeur d'Alene Forest except the 3-inch stem height was dropped. Ten bushes were treated for each test with each bush having from 3 to 8 feet of live stem.

TABLE 8

1947 DECAPITATION TESTS APPLYING 2,4-D TO CUT STEM SURFACES OF R. LACUSTRE AND R. VISCOSISSIMUM

Plot No. & Date Treated		Forest	Type of 2,4-D Product	Per Cent	Type of Decapitation	Ribes Species	No. Bushes	Feet Live Stem
7/14	1	Coeur d'Alene	Butyl ester 2,4-dichlorophenoxy-acetic acid in water	5%	Through crown	vis.	37	725
	2				1" above crown	vis.	54	860
	3				2" above crown	vis.	53	825
	4				3" above crown	vis.	48	900
	5			10%	Through crown	vis.	37	930
	6				1" above crown	vis.	34	780
	7				2" above crown	vis.	47	1,075
	8				3" above crown	vis.	33	850
	9			20%	Through crown	vis.	30	825
	10				1" above crown	vis.	31	870
	11				2" above crown	vis.	36	940
	12				3" above crown	vis.	57	1,150
	13		No chemical	Check	Through crown	vis.	30	735
	14				1" above crown	vis.	38	775
	15				2" above crown	vis.	31	840
	16				3" above crown	vis.	37	750
8/1	17	St. Joe	Butyl ester 2,4-dichlorophenoxy-acetic acid in water	5%	Through crown	lac.	10	51
	18				1" above crown	lac.	10	34
	19				2" above crown	lac.	10	69
	20			10%	Through crown	lac.	10	61
	21				1" above crown	lac.	10	33
	22				2" above crown	lac.	10	209
	23			20%	Through crown	lac.	10	64
	24				1" above crown	lac.	10	92
	25				2" above crown	lac.	10	89
	26		No chemical	Check	Through crown	lac.	10	47
	27				1" above crown	lac.	10	82
	28				2" above crown	lac.	10	57

DEVELOPMENTAL WORK IN DISEASE SURVEY METHODS: A PROGRESS REPORT ON A STUDY OF THE DIFFERENCE IN DAMAGE ESTIMATES BASED ON NUMBERS OF TREES LOST AND ON NUMBERS OF STOCKED QUADRATS DEPOPULATED DUE TO BLISTER RUST

INTRODUCTION AND PURPOSE OF THE STUDY

It has been realized for some time that the tendency for natural western white pine reproduction to become established in scattered and often dense clumps might have an important effect on the choice of a method for the evaluation of losses caused by the blister rust disease. Surveys and other disease studies designed to appraise such losses have, heretofore, supplied information on the numbers of white pines lost rather than on the numbers of units of growing space (stocked quadrats) depopulated by blister rust[1/]. In white pine stands of all ages below maturity, the examiner may find many relatively dense clumps of trees in which rust damaged pines are being adequately replaced by healthy or harmlessly infected pines of equal dominance and chance for survival. Were the stand composed of two such trees close enough together on the ground so that growing space was sufficient for but one 50 years hence, or at maturity, then the stand estimated 50 per cent damaged on the basis of lost trees is actually uninjured. One surviving tree adequately stocks the unit of area.

This study was undertaken to determine whether measurable differences existed between losses attributable to blister rust as estimated by the methods now in use and as estimated by a modification of the stocked quadrat method. The effects of stocking intensity, rust intensity, and stand age on rust damage in general and on the differences in rust damage as estimated by the two methods were also to be considered.

Valuable assistance in determining quadrat sizes for the various age classes of western white pine was given by Mr. C. A. Wellner, Silviculturist, Northern Rocky Mountain Forest and Range Experiment Station. Mr. A. W. Slipp, Assistant Professor of Forestry (in charge, University of Idaho School of Forestry - Bureau of Entomology and Plant Quarantine - Forest Service cooperative blister rust study) made available summarized data useful in judging potentially damaging blister rust cankers.

METHODS

1. Selection of Plots and Determination of Plot Size

On the Clearwater, St. Joe, and Coeur d'Alene National Forests, square sample plots on moderately good to good sites (Site index 60 to 70) were selected from within a range of 33 combinations of the variates age class of white pine, stocking intensity of white pine, and intensity of existing rust infection as shown in the following table:

1/ For an informative discussion of the stocked quadrat concept see: Munger, Thornton T., Stocked Quadrats vs. Number of Trees as a Basis for Classifying Reforesting Land. Pac. N.W. For. Expt. Sta. Res. Notes 33: 2-7; Jan. 1945.

Age Class	Stocking Intensity (% quadrats stocked with white pine crop trees)	Rust Intensity (% white pine crop trees infected)
0-10	Light, 0.0 - 33.3	Light, 0.0 - 33.3
11-20 21-40	Medium, 33.4 - 66.7	Medium, 33.3 - 66.7
41-60	Heavy, 66.8 - 100.0	Heavy, 66.8 - 100.0

Number Variables 4 x 3 x 3 = 36 combinations

In the 0-10 year age class, plots meeting the specification of heavy rust intensity were not to be found since the number of years necessary to produce heavy rust on pine is usually more than 10. This reduced the number of possible combinations of the three variates to 33. Trees 20 years old and younger were divided into two age classes due to greater vulnerability to rust damage characteristic of the youngest (0-10 year) class. Under conditions of equal rust intensity younger trees are, presumably, more vulnerable to blister rust because of their relatively greater proportion of low, well-needled trunks and short branches.

Plots varied in size with age class but always contained the uniform number of 100 square sub-plots or quadrats. Quadrats were of a size estimated to be approximately the area which in the age class being investigated should be stocked with at least 1 white pine crop tree in order to fulfill a full stocking requirement at maturity (120 years).

Figure 1 shows the method by which quadrat sizes were computed. The solid line curve represents Wellner's estimation of the minimum number of evenly distributed white pine crop trees per acre necessary at any given age to produce a fully stocked stand at maturity. The curve based on Haig's[1/] normal stand table values, site index 65, shows that in the younger age classes large numbers of trees 0.6 inches D.B.H. and over are required to produce fully stocked stands at maturity. The estimated curve starts at 0 years with a requirement of only 500 evenly distributed trees per acre. The two curves never coincide because, from the earliest age, the 0.6 inch D.B.H. curve undoubtedly includes unevenly distributed crop trees located in dense clumps of trees, plus intermediate and suppressed non-crop trees. A further comparison of the estimated curve with the normal stand table curve for trees 12.6 inches and over (perhaps similar to the dominant and codominant crop trees in stands near maturity) shows closer agreement as the maturity age is approached.

Estimated minimum numbers of evenly spaced crop trees necessary to produce fully stocked stands at maturity were obtained for the age classes from the solid line

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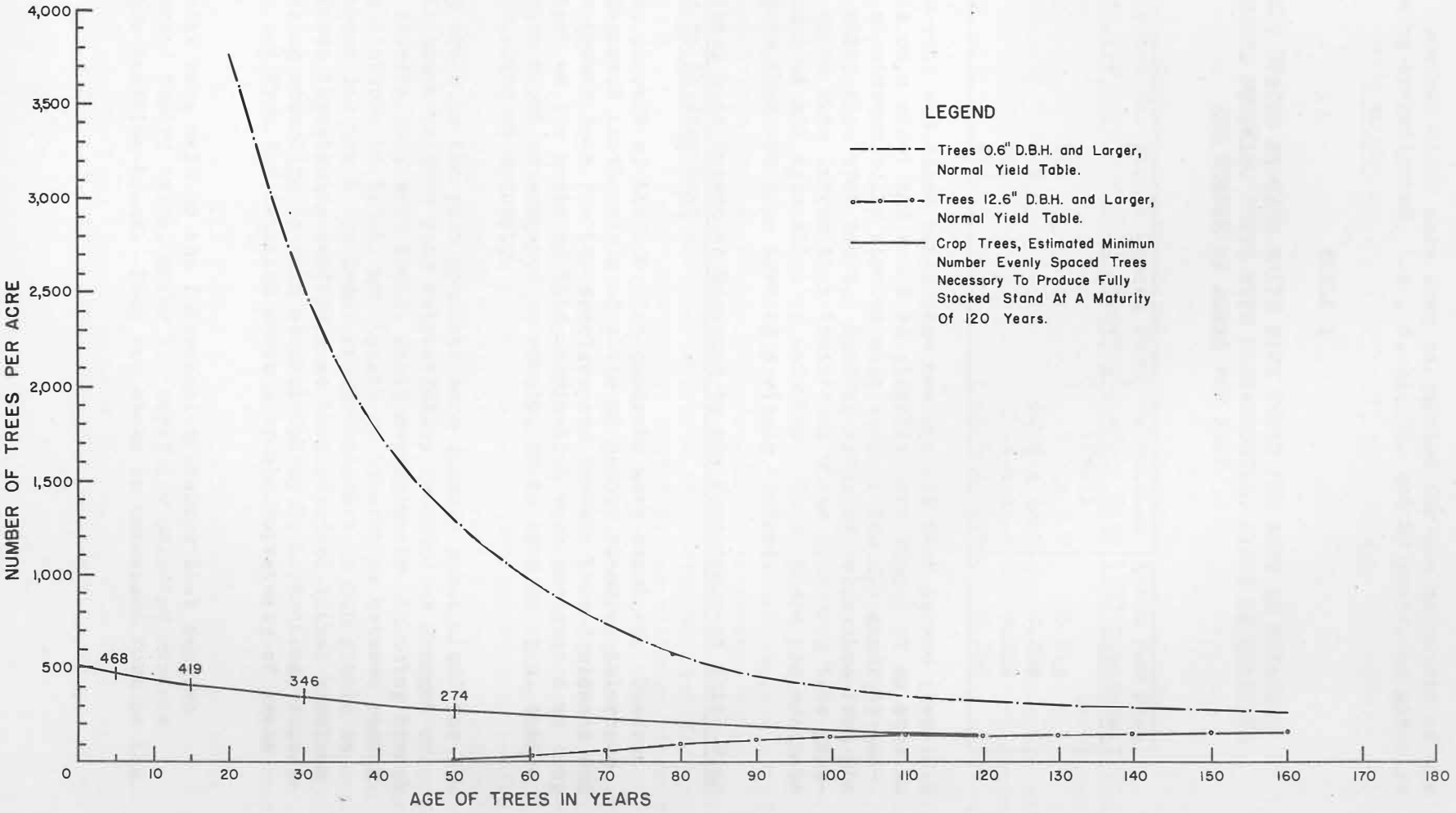
1/ Haig, Irvine T. Second-growth yield, stand, and volume tables for the western white pine type. U.S.D.A. Tech. Bull. 323: 1-67; Oct. 1932.

FIGURE I. NORMAL YIELD TABLE AND ESTIMATED STOCKING CURVES FOR NUMBERS OF TREES PER ACRE TO PRODUCE FULLY STOCKED WESTERN WHITE PINE STANDS AT MATURITY.
(SITE INDEX 65)



curve of figure 1. Quadrat sizes were then calculated for the midpoints of the four age classes being investigated, i.e., 5, 15, 30, and 50 years, as given in table 1.

TABLE 1

NUMBER OF EVENLY SPACED WESTERN WHITE PINE TREES PER ACRE AS OBTAINED FROM THE ESTIMATED STOCKING CURVE WITH CORRESPONDING SIZES OF QUADRATS AND NUMBER OF ACRES PER PLOT

Age Class (Years)	Estimated No. Evenly Spaced Crop Trees Per Acre for Full Stocking	Calculated Quadrat Size (Feet)	Acres Per Plot (100 Quadrats)
0-10	468	9.7 x 9.7	0.216
11-20	419	10.2 x 10.2	0.239
21-40	346	11.4 x 11.4	0.289
41-60	274	12.6 x 12.6	0.364

A plot in the 11-20 year age class would thus measure 102 feet square (ten 10.2 feet square quadrats on a side) and would be slightly less than $\frac{1}{4}$ of an acre in size. It would be considered fully stocked when each of its 100 quadrats contained one or more white pine crop trees. Quadrat areas as calculated from the estimated stocking curve were larger than individual white pine crop tree growing space requirements at all ages short of maturity. Thus, there was adequate growing space for more than one crop tree on a single quadrat.

2. Determining Blister Rust Damage as Measured by the Percentage of White Pine Crop Trees Lost Due to Blister Rust

Trees of all species on each of the 100 plot quadrats were examined. Quadrat crop trees were designated on the basis of state of canopy closure, tolerance and expected future growth rate for the species, and present tree dominance and position. Trees which on the basis of this examination were designated as crop trees were those which might be expected to remain, or to have an equal chance of remaining, in the stand at maturity.

All white pine crop trees on the plot quadrats were closely scrutinized for infection. Trees with trunk cankers were automatically recorded as damaged or lost. When branch cankers only were found, basic measurements including branch diameter, remaining distance to trunk, and length of internodes between canker and trunk were recorded for the 5 (or less) cankers closest to but within 24 inches of trunk. These threatening cankers were then adjudged either harmless or potentially damaging according to data accumulated by R. L. MacLeod, supplemented by data obtained from the detailed records of the University of Idaho blister rust study.

MacLeod's measurements were made on the internodal distances that cankers crossed in their spread toward trunk, using 720 carefully selected cankers which had died before reaching trunk. They are shown in condensed form on the following page.

Cankered Branch Diameter Class (Inches)	Length of Longest Internode(s)[1] Crossed by Canker in Spread Toward Trunk (Inches)
0 - $\frac{1}{4}$	3
$\frac{1}{4}$ - $\frac{1}{2}$	6
$\frac{1}{2}$ - $\frac{3}{4}$	6
$\frac{3}{4}$ - 1	6
1 - $1\frac{1}{4}$	9

Possible weaknesses in the method of selecting and measuring cankers after death are apparent. By the time the cankers were measured it might no longer have been possible to make reliable measurements on the length of the internode(s) crossed. Many if not all of the lateral branches which contributed to canker development might have been dead. To check MacLeod's mean values they were compared with the means of similar measurements made on the periodically inspected cankers under observation in the University study. Interpretations based on data from the latter study are the author's.

Approximately 1350 blister rust cankers and the branches which support them are now under annual observation in the University study. During the 8 years since the earliest of these cankers originated more than one-third have already died. The most common cause of death was the death of supporting branches caused by flagging of other cankers on the same branches which originated closer to the trunk. However, 116 of the dead cankers were capable of reaching trunk unhindered by other cankers nearer to trunk or by other influences such as death of the entire tree caused by injuries or the action of other fungi and insects. Potentially, each of these cankers was capable of damaging the tree, a threat eliminated by canker death. In most cases the detailed records on condition of cankered branches and on canker development gave a clear picture of the cause of death of the threatening cankers. Suppression of cankered branches accounted for the death of 35 of the 116 cankers. The remainder died as a result of branch flagging caused by a variety of factors including normal canker girdling, accelerated girdling caused by secondary fungi attacking cankered tissues and girdling by rodents gnawing cankered tissues. The cause of death, internodal spread, average number of nodes crossed, and months of canker life are shown for cankers on branches of various diameters in Table 2 on the following page.

A comparison of the University study data with MacLeod's data shows that the average lengths of longest internode(s) crossed by cankers prior to death are quite similar in the two smallest branch diameter classes. Averages calculated after removal of the 35 cankers which died as a result of branch suppression are not much different from those which include all 116 dead cankers. These two studies seem to bear out the belief that canker death is most frequently caused by a combination of two factors. These are (1) flagging of the cankered branch with

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[1] Length of longest internode(s) crossed refers to length in inches of the longest internode, or group of internodes, over which the canker margin grew toward trunk without reaching a new source of elaborated food such as an internode bearing live needles or a node supporting live lateral branches.

attendant discontinuance in the supply of elaborated food from portions of the branch distil to the canker, and (2) the presence of a long internode, or group of internodes, without live needles or live lateral branches intervening between the canker and the tree trunk.

TABLE 2

CAUSE OF DEATH AND GROWTH POTENTIAL OF FORMERLY THREATENING DEAD CANKERS --UNIVERSITY OF IDAHO BLISTER RUST STUDY

Branch Diameter Class (Inches)	Cause of Death			Av. Total Length Spread Toward Trunk (Inches)	Av. Length Longest Internode(s) Crossed (Inches)	Av. Length Internode(s) Where Canker Died (Inches)	Average Number of Nodes Crossed	Av. No. of Months of Canker Life
	Suppression of Branch	Flagging: Normal from Parasitism and from Gnawing	Totals					
0-$\frac{1}{4}$	24	27	51	3.34	3.07	5.74	1.2	35.5
$\frac{1}{4}$-$\frac{1}{2}$	11	50	61	5.76	4.12	6.78	1.4	52.0
$\frac{1}{2}$-$\frac{3}{4}$	0	3	3	8.10	6.73	7.53	1.0	52.3
$\frac{3}{4}$-1	0	1	1	5.30	3.90	3.90	1.0	58.0
Totals	35	81	116					
Avs.				4.75	3.73	6.32	1.3	44.8
%	30.2	69.8	100.0					
Avs. Flagged Canks. Only				4.76	3.67	5.92	1.3	46.3

From the two studies outlined above a simplified method for judging cankers, either as harmless or as potentially damaging, was developed for interpreting threatening canker measurements already recorded in the field. All cankers within 24 inches of trunk on branches up to $\frac{1}{2}$ inch in diameter were judged capable of crossing internode(s) up to 6 inches in length, those on branches larger than $\frac{1}{2}$ inch and up to $1\frac{1}{4}$ inches in diameter, up to 9 inches in length. If in the course of the average 6- or 9-inch spread toward trunk the canker margin would grow into an internode with green needles or pass over a node having live lateral branches, the canker was considered capable of continued growth toward trunk according to the diameter of the internode(s) into which it had spread. Extent of blister rust mycelium beyond the visible canker margin was not considered except when the canker under observation was

in the internode(s) nearest to trunk. When this condition existed, an additional inch was added to the length of the longest internode(s) across which the average canker might be expected to spread[1].

In the field, additional data were recorded on age of wood cankered, stage of development of cankers, cankered branch flagging, parasitism by secondary fungi, rodent injury, and insect injury.

3. Determining Blister Rust Damage As Measured by the Percentage of White Pine Crop Tree Stocked Quadrats Depopulated by Blister Rust

Each of the 100 plot quadrats was examined as a unit and the number of crop trees was tallied by species. Quadrats either supported none or from 1 to several crop trees, often of as many different species. Damage to stocked quadrats was then determined by applying the procedures for examination of individual white pine crop trees already outlined, and by considering the unit to be all crop trees in the quadrat rather than the individual crop trees. When a white pine stocked quadrat was found to contain one or more healthy or harmlessly infected white pine crop trees it was recorded as adequately stocked. Contrariwise, when the quadrat contained only trunk cankered crop trees or crop trees with potentially damaging branch cankers it was considered to represent a loss in growing space attributable to blister rust. Instances were found where the release of non-crop trees, then intermediate in dominance, would soon be brought about by the top-flagging and death of trunk cankered crop trees. Such trees were tallied separately as "intermediate replacements" which would adequately stock the quadrat otherwise depopulated by the rust. A stand tally was taken by heights, including all trees of all species on the plot.

DISCUSSION AND RESULTS

During the 1947 field season 24 plots were established and examined. Difficulty in making preliminary surveys of stocking and rust intensity prior to plot examination resulted in 6 of the plots being similar in specifications to others already examined. The 24 plots, therefore, included approximately half of the combinations of age class, stocking intensity, and rust intensity desired to complete the sampling plan. Plot numbers, specifications, and locations are shown in Table 3. Rust intensities shown in Tables 3 and 4 are not necessarily general for the locality or National Forest. They represent only the plot sites selected to fall in a given rust intensity class.

Table 4 gives the results for the 24 plots. The left half of the table gives the percent of quadrats occupied by white pine crop trees (stocking intensity), the percent of crop trees infected (rust intensity), and the corresponding damage expressed as percent of crop trees damaged or as percent of crop tree occupied quadrats depopulated. The right half of the table shows the estimated numbers of white pine (both crop and non-crop trees) per acre, the total number of crop trees of all species per acre, and the number of evenly spaced white

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[1] See Ehrlich, John, and Robert S. Opie. Mycelial extent beyond blister rust cankers on Pinus monticola. Phytopath. 30(7): 611-620; July 1940.

pine crop trees per acre (stocked quadrats per acre). The acre totals may be of some help in interpreting the stocking and damage figures. The plot percentages are arrayed by stocking intensity groups to show the apparent effect of stocking intensity on stocked quadrat depopulation. It will be remembered that the stocking plan is incomplete and that means are necessarily biased by unequal numbers of plots in the various stocking, rust, and age classes.

TABLE 3

NUMBERS, SPECIFICATIONS, AND LOCATIONS OF PLOTS EXAMINED IN 1947

Age Class	Plot No.	Stocking Intensity	Rust Intensity	Location
0-10	9	Medium	Light	Ames Creek, Coeur d'Alene Natl. Forest
	13	"*	"	Mutton Gulch, Clearwater Natl. Forest
	22	"	"	Reeds Creek, north side, Clearwater Natl. Forest
	4	Medium	Medium	Cameron Creek, Cedar Camp, St. Joe Natl. Forest
	12	Heavy	Light	Washington Creek, Clearwater Natl. Forest
	14	Heavy	Medium	Reeds Creek, south side, Clearwater Natl. Forest
11-20	20	Light	Light	New Shea Meadows Road, south side, St. Joe N. F.
	7	Medium	Light	Oviat-Cameron Creeks Summit, St. Joe N. F.
	8	"	"	Oviat Creek, Burn at Head, St. Joe Natl. Forest
	23	Medium	Medium	Incline Lookout, St. Joe Natl. Forest
	1	Medium	Heavy	Sherwin Summit, St. Joe Natl. Forest
	6	Heavy	Light	Oviat Creek, West Side, St. Joe Natl. Forest
	15	Heavy	Medium	Bottom Creek Mouth, Coeur d'Alene Natl. Forest
	16	"	"	Burnt Cabin Creek, Coeur d'Alene Natl. Forest
21-40	21	Light	Medium	New Shea Meadows Road, north side, St. Joe N. F.
	2	Light	Heavy	Cedar Creek, St. Maries River, St. Joe N. F.
	5	"	"	Keeler Creek, St. Joe Natl. Forest
	11	Medium	Heavy	Clarkia Ranger Station, St. Joe Natl. Forest
	10	Heavy	Medium	Deception Creek, Coeur d'Alene Natl. Forest
	19	Heavy	Heavy	Gold Center Creek, St. Joe Natl. Forest
41-60	18	Light	Heavy	Gold Center, St. Joe Natl. Forest
	24	Medium	Heavy	Clarkia BRC Hdqrs., St. Joe Natl. Forest
	3	Heavy	Heavy	Flewsie Creek, St. Joe Natl. Forest
	17	"	"	Middle Fork St. Maries River, St. Joe N. F.

* Dittos indicate plots of similar specifications.

In all but 4 of the 24 plots the percent of crop trees damaged by the rust is estimated to be less than the percent infected by the rust. The younger trees appear to be more susceptible to rust damage, for three of the four plots (Numbers 8, 13, and 22) showing damage equal to infection are in the youngest age classes. The fourth plot (Number 17) lies in the locality of an early infection center where the rust, even on the 50-year-old poles, is extremely intense. The other twenty plots contained at least a few crop trees which were adjudged harmlessly infected. In all but 2 of the 24 plots the percent of western white pine crop tree stocked quadrats judged as depopulated by the rust is less than the percent of crop trees judged damaged by the rust. Apparently an inverse relationship exists between intensity of stocking and degree of rust damage to stocked quadrats. Proportionally fewer quadrats are depopulated on the medium and heavily stocked plots than on the lightly stocked plots. It will be noted

that where stocking is extremely heavy (i.e., Plot 14, Reeds Creek, with more than 5,000 white pine per acre and 98 percent of its quadrats stocked with white pine crop trees) the difference between the amount of damage calculated from the number of crop trees lost and the amount of damage calculated from the number of stocked quadrats depopulated is as much as 40 percent. For the entire 24 plots, percentages of damage based on loss of crop trees are about 1½ times as great as those based on depopulated quadrats. The mean value for quadrats depopulated is 25.8 percent, that for trees damaged 38.2 percent or about 1½ times as great.

SUMMARY

1. The present report shows the progress made in an incomplete study into the effects of stocking, rust intensity, and age of trees on the percentages of blister rust damage calculated from numbers of trees damaged and from numbers of stocked quadrats depopulated.

2. A method is described in which crop trees are designated within quadrats which increase in size with stand age. The average lengths of unneedled internodes without live branches, which may be expected to cause canker death following branch flagging are employed in a new method of judging which white pine crop trees are rust damaged and which quadrats are depopulated by the rust.

3. Mean percentages of trees damaged and of quadrats depopulated are biased by inequality in numbers of plots among the various stocking intensity, rust intensity, and age classes. In general, a strong trend is indicated toward overestimating the amount of rust damage when using number of crop trees lost, regardless of their position on the ground. The mean percentages of crop trees lost and of stocked quadrats depopulated on the 24 plots indicate that percent of damage estimations based on lost trees will exceed by approximately 1½ times those based on depopulated quadrats.

TABLE 4

PERCENTAGE OF WHITE PINE CROP TREES AND WHITE PINE STOCKED QUADRATS LOST DUE TO BLISTER RUST, PER ACRE TOTALS FOR CROP TREES (ALL SPECIES) AND FOR WESTERN WHITE PINE CROP TREES, TOTAL NUMBER OF WHITE PINES PER ACRE

Plot Number	Age Class	Percent Quadrats WWP Stocked	Percent Crop Trees Infected	Percent Crop Trees Damaged	Percent WWP Stocked Quadrats Depopulated	Total No. WWP Per Acre	Total No. Crop Trees Per Acre (All Species)	WWP Crop Tree Stocked Quadrats Per Acre		
								Depopulated	Unharmed	Total
2	21-40	16	100.0	94.1	87.5	102	213	62	9	71
5	21-40	28	67.8	39.4	39.3	121	266	38	59	97
18	41-60	28	100.0	80.0	78.6	162	153	60	17	77
20	11-20	20	28.6	19.0	20.0	92	608	17	67	84
21	21-40	25	51.7	17.2	16.0	118	256	14	73	87
Lt. Stocking Avs.		23.4	70.4	48.9	47.0	119.0	299.2	38.2	45.0	83.2
1	11-20	55	87.5	38.5	30.9	1040	1040	170	380	550
4	0-10	52	61.1	55.7	36.5	697	978	88	155	243
7	11-20	52	17.3	16.0	9.6	390	507	21	197	218
8	11-20	39	5.7	5.7	0.0	289	436	0	163	163
9	0-10	54	25.0	21.9	9.3	899	538	24	229	253
11	21-40	60	90.0	38.8	26.7	564	401	56	152	208
13	0-10	57	7.8	7.8	0.0	894	622	0	267	267
22	0-10	52	31.6	31.6	11.5	941	842	28	215	243
23	11-20	46	52.5	45.9	37.0	302	1014	71	122	193
24	41-60	37	85.0	32.5	21.6	216	340	22	79	101
Med. Stocking Avs.		50.4	45.1	31.4	18.5	623.2	671.8	48.0	195.9	243.8
3	41-60	82	98.0	65.1	46.3	543	435	95	110	205
6	11-20	80	25.9	18.4	3.8	2455	867	12	323	335
10	21-40	96	66.9	19.2	8.3	3564	571	28	304	332
12	0-10	79	13.4	11.9	5.1	2059	749	19	351	370
14	0-10	98	49.7	47.4	7.1	5368	1292	23	426	459
15	11-20	83	38.8	10.8	3.6	3092	750	13	335	348
16	11-20	69	35.5	29.0	17.4	1852	729	50	239	289
17	41-60	72	81.7	81.7	88.9	647	548	175	22	197
19	21-40	87	99.4	84.5	75.9	1754	882	228	73	301
Hvy. Stocking Avs.		82.9	56.5	41.1	27.5	2370.4	758.1	71.4	242.6	315.1
Grand Averages		57.0	53.4	38.2	25.8	1173.4	626.5	54.8	182.0	237.1

BLISTER RUST INVESTIGATIONS IN 1947

Infection Conditions During 1947

For the reason studies are of damage in stands of advance reproduction and pole, a few excerpts are made from T. S. Buchanan's 1938 report "Blister Rust Damage to Merchantable Western White Pine" to recall to mind the relationship between time required for damage with the size of tree. "Damage may occur within 5 years after infection in the smaller sizes while significant damage in merchantable trees may not occur until 30 or more years after infection." As an example Buchanan estimated that trees with killing cankers and 16.8 feet in height would be damaged in 5 years, trees 37.0 feet in height in 7 years, trees 67.4 feet in 9 years, trees 87.0 feet in 13 years, trees 117.4 feet in 15 years, and trees 157.2 feet in height in 20 years. The time required for damage may well be expected to be shortened by the dual action of new damage cankers and the increase in twig and branch infections if the trees continue to be exposed to ribes infected with the rust, according to Buchanan.

The inspection of ribes on plots widely distributed over northern Idaho in August revealed more bushes and leaves infected this year than in 1946 but the amount of rust was considerably less. This indicates weather conditions in the spring were favorable for spread of the rust from pine to ribes but less favorable during the summer for rust development and intensification on ribes leaves due to the very dry July and August season. The abnormally wet fall season with cool air temperatures produced ideal weather conditions for pine infection. All factors indicate that spread of the rust from ribes to pine probably amounted to a major wave of infection. With such indications, areas of white pine reproduction and pole which have numerous ribes present or in close association and are known to have 35 to 50 per cent infection probably have been damaged beyond the point where any further economic value can be attached to the present stand of pine. Such areas should be given low priority for the next three years until the amount of infection can be definitely determined.

Crystal Creek Plot 11 (T. 44 N., R. 1 E., secs. 16, 21, St. Joe Operation)

This plot was established in 1937. No eradication of ribes has been done on the area. The trees are now approximately 30 years old. The plot is one chain wide and 45 chains long at right angles to the contours. In 1937 the pine were completely inspected. Ribes viscosissimum averaged 201 bushes with approximately 5,000 feet of live stem per acre. Although no detailed check of the ribes was made in 1947, the number of bushes appeared to be approximately the same but the live stem had decreased. In 1937 the pine were found to be 67 per cent infected. In 1947, 135 trees in groups of five per chain were inspected. Of the 97 per cent of the trees found infected, 5 per cent are without killing cankers, 36 per cent have trunk cankers, and 56 per cent are dead. Since the stand had 67 per cent infection in 1937, the 1937 wave completed the destruction of the economic value of this stand. In other words, the presence of the disease in this stand for 14 years seriously damaged this stand.

Middle Fork St. Maries River Plot (T. 42 N., R. 2 E., secs. 23, 24, St. Joe Operation

This plot, established in 1937, consists of a strip one chain wide and 25 chains long. It starts at the junction of the road and Braum Creek (formerly Foolhen Creek), and runs perpendicular to the contours. The stand consists of a 20- to 40-year age class of white pine, Douglas fir, white fir, hemlock, and cedar. The complete inspection of this plot in 1937 showed that 41.5 per cent of the trees was infected and that approximately half of the infected trees would be killed. In 1947 the plot was checked again by examining five dominant or codominant trees at half chain distances. A total of 228 trees was examined. This inspection revealed 92 per cent infection, all but 3 per cent being fatal. The results are essentially in agreement with those reported in serial No. 139 for an area two miles north and one mile west of this plot in the same age class. Apparently a large portion of this young age class white pine in the drainage must be considered lost from blister rust with the result that the stand at maturity will consist of Douglas fir, white fir, hemlock, and cedar. Incidental to the pine inspection five R. lacustre were found. An analysis of the killing cankers, that is, one canker for each tree, indicated an accumulative increase of the rust as follows: .88 per cent in 1923, 6.14 per cent in 1927, 19.74 per cent in 1933, 55.70 per cent in 1937, 87.72 per cent in 1941, and 89.47 per cent in 1943-44. These results emphasize the necessity of timing eradication work according to the progress of the disease. These data show that the stand was seriously damaged by 1937, that is, fourteen years after the introduction of the disease. Apparently, control must be established within 14 years after the date the disease is introduced. The establishment of control in less time will reduce the chances of getting major losses from the rust. The plot was first eradicated of ribes in 1934 at the time crews were working adjoining areas and reworked in 1940 and 1946.

Squaw Creek (T. 40 N., R. 2 E., secs. 30, 19, 20, St. Joe Operation)

Part of the stand on this area is a moderately stocked stand of reproduction approximately 20 years old and part is a pole stand 60 to 80 years old. Three random spot checks were made in the reproduction consisting of 50 trees for each of two cases and 75 in the other. These samples were taken about a half-mile apart. Because of the similarity of the results from the three locations no further samples were taken and the results from the three samples were combined. These data indicated that approximately 89 per cent of the trees have visible infection and that 76 per cent of all the trees have killing cankers. An analysis of killing cankers indicated that the disease had progressed as follows: approximately 11 per cent originated in 1933; this increased to 39 per cent in 1937, 65 per cent in 1941, and 76 per cent in 1944. The high percentage originating in 1933 suggests that the disease probably originated somewhat earlier in adjacent older stands.

In the pole stand 16 dominant or codominant trees approximately 80 feet tall in four different locations were thoroughly examined. Approximately 88 per cent of the trees was infected, and 75 per cent of all the trees had killing cankers. These results were so similar to those in reproduction that no further samples were taken. The only difference was that infection of 1923 and 1927 origin was found. This small sample also indicated that the progress of

the disease in the pole stand was approximately the same as that in the reproduction. These results also suggest that pole stands may be as seriously damaged as reproduction by exposure to the rust for the same length of time.

The samples from both of these age classes indicate that control should have been established by 1937 or approximately 14 years after the disease became established in order to save the stand from serious loss. Sections 19 and 20 were given first working in 1934 and reworked in 1939. Section 30 was first worked in 1933 and reworked in 1939.

Upper Basin (T. 40 N., R. 2 E., sec. 2, and T. 41 N., R. 2 E., sec. 26, St. Joe Operation)

This area was logged about 1930. Although the tree population of almost pure white pine is not heavy, the trees are well distributed so that the area is well stocked with a 15- to 20-year age class.

In sections 2 and 26 all the trees were inspected on .6 of an acre in each case. A total of 195 trees were examined, 93 in the first case and 102 in the second. The samples were taken about two miles apart. Since the samples were so similar the data were combined. All trees were found visibly infected except one. Approximately 95 per cent of the trees had killing cankers. Fourteen per cent of the killing cankers originated in 1933, increasing to 65 per cent by 1937, 92 per cent by 1941, and 95 per cent in 1944. The high per cent infection originating in 1933 indicates that the rust was already established in the vicinity when the white pine germinated. Due to the fact that the ribes germinated with pine and continued to germinate for four or five years, the rust developed so rapidly in this area that no attempt has been made to establish control of the rust. This area was worked once by CCC crews during the period of 1933 to 1935.

Quartz Creek (T. 37 N., R. 5 E., secs. 4, 8, Clearwater Operation)

A random check of nine dominant trees in this 50-70 year age class, ranging from 75 to 105 feet tall, showed that 89 per cent of the trees examined were infected. All of the infected trees had killing cankers.

Blister Rust Headquarters (T. 36 N., R. 5 E., sec. 10, Clearwater Operation)

An opportunity was offered to examine 11 trees in this area which had been felled recently by a right-of-way crew. The area had been logged in 1941, consequently these were residual trees. The trees were 70 to 90 years old and 50 to 125 feet tall. This sample showed 91 per cent of the trees infected with blister rust. Sixty per cent of the infected trees had probable killing cankers. No cankers older than 1941 were found.

Powder House Area (T. 37 N., R. 5 E., sec. 27, Clearwater Operation)

Fifteen trees in the 50-60 year old white pine stand west of the Powder House plot were examined. The trees are 60 to 80 feet tall. Only dominant and codominant trees were inspected. The results of this examination showed that 93 per cent of the trees are visibly infected and 80 per cent of the trees examined had killing cankers. Of the 12 trees with killing cankers, the cankers

originated were as follows: 1 in 1923, 2 in 1927, 3 in 1933, and 6 in 1941. Cankers found on the trees were as follows: 1 in 1923, 2 in 1927, 5 in 1933, 31 in 1937, 71 in 1941, and 2 in 1944. Eradication of the ribes on the area in 1933 and 1936 reduced them to approximately 2 bushes per acre. Apparently these were enough ribes to continue spread of the rust on ribes.

General Conclusions from Sampling of White Pine Pole Stands

Although the samples in pole stands are small, the results suggest that the damage may be as severe in pole as in reproduction. Because of the length of time required for these trees to be girdled, the loss will be gradual and not apparent for some time. However, the loss is certain since as soon as the tops die out or are blown out the associated trees may suppress the remaining lateral branches and the trees will die. Since the sample trees were dominant and codominant trees the percentages represent the loss of crop trees. The data also indicate that the ribes must be quite thoroughly eradicated from a stand within approximately fifteen years after the introduction of the rust if serious losses are to be prevented. The proper timing of eradication work is fundamental to the success of the control program. Although examination of pole stands is slow and difficult work, steps should be taken to examine all pole stands in the control area in order that further eradication work or salvage cuttings may be most effectively planned.

Tuberculina maxima

Although this parasite of blister rust cankers has been observed on individual trees over most of the white pine region of northern Idaho, this is the first season it has spread to such an extent that it will be a real factor in reducing aecial production. In one area on the Powder House Plot where a considerable number of the trees had trunk cankers, 80 per cent of these cankers were infected with Tuberculina maxima, many being completely covered with this parasite. Another area on Trail Creek Plot 6 had 14 per cent of the old cankers infected with this parasite. An examination of the infected cankers indicated that the parasite had spread rapidly during the last two years. Permanent plots were established around these two centers in order to follow the spread of the parasite during the next few years.

III. LABORATORY, GREENHOUSE, AND SPECIAL ACTIVITIES

At Berkeley, principal laboratory and greenhouse activities were (1) testing of new herbicides on ribes that have been resistant to dilute 2,4-D formulations, (2) germination tests on ribes seed, especially the effects of 2,4-D on seed viability and the viability of seed extracted soils from representative pine areas, (3) conferences with technicians of spray equipment industry with special reference to light weight sprayers for jeep or pickup truck and to methods and equipment for spraying 2,4-D by helicopter and by fixed wing aircraft. In furnishing new organic compounds for testing as herbicides, the Division of Insecticide Investigations (Dr. R. C. Roark) has been especially helpful. Of the many new formulations tested, salts and esters of high grade 2,4,5-trichlorophenoxyacetic acid were the only ones sufficiently promising to justify field tests in 1947. On greenhouse-grown Ribes lacustre, R. viscosissimum, R. lobbii, and R. binominatum, the ester of 2,4,5-T in kerosene 1,000 p.p.m. or more has been 100 per

cent effective. Preliminary observations on field plots treated with 2,4,5-T are not conclusive, suggesting that field plants will be harder to kill than greenhouse plants. Further field tests on dilute and concentrated high grade 2,4,5-T salts and esters and further studies on the seasonal effect of these 2,4,5-T compounds as influenced by the purity of the herbicide are now needed.

At Spokane, a study was made to determine the usefulness of soil analysis by rapid chemical tests in judging the potential ribes problem prior to reaching decisions relative to the most desirable cutting practice for a stand of timber. The conclusion reached was that soils do not provide a reliable index of ribes potentials, but along with fire history of an area, considerable importance can be attached to soil fertility as related to fire history and the potential problem of ribes. These results corroborate similar work undertaken at Berkeley on soil samples collected from typical sugar pine areas. Other incompleted projects include (1) the improvement of techniques in preconditioning white pine seed for direct sowing, (2) germination of stored ribes seed recovered from undisturbed forest soils following logging and fire to determine period of longevity after a major forest disturbance, (3) propagation of ribes in laboratory for preliminary chemical tests, (4) development of workable techniques for rooting white pine cuttings from supposedly rust resistant trees, and (5) correlation of weather data with years of varying pine infection.

During 1947 the following published papers or special reports dealing with the above-mentioned subjects were prepared by methods personnel:

Bureau MS 7974:
Germination of Phacelia Seeds.
Madrono, Jan. 1947. IX: 17-20.
. . . . . C. R. Quick

Bureau MS 8411:
The Control of Weed Hosts of Plant Diseases.
Ninth Annual Western States Weed Control Conference, pp. 18-21.
Portland, Ore. Feb. 6-7, 1947.
. . . . . H. R. Offord

Serial No. 134:
Effects of Logging of Virgin Timber on Ribes Regeneration in the Central Sierra Nevada.
. . . . . C. R. Quick

Serial No. 135:
Experimental Germination of Ribes and Pine Seeds.
Series of 1945.
. . . . . C. R. Quick

Serial No. 136:
Germination Tests on Sugar Pine Seed.
. . . . . C. R. Quick

Serial No. 137:
Some Experimental Aspects of Ribes Seed Longevity.
. . . . . C. R. Quick

Serial No. 138:
Pruning White Pine Reproduction to Salvage a Stand Heavily Infected with White Pine Blister Rust.
. . . . . C. R. Stillinger

Serial No. 139:
Blister Rust Damage to Pole-Sized Western White Pine on the Middle Fork of the St. Maries River.
. . . . . R. T. Bingham

Serial No. 140:
Preliminary Report on the Ames Creek Small Bush Study.
. . . . . R. T. Bingham

Serial No. 141:
Factors Related to the Effective Use of 2,4-D for Ribes Eradication.
. . . . . H. R. Offord

PHOTOGRAPHIC AND EDUCATIONAL WORK, 1947

By
Frank O. Walters, Assistant Regional Leader
H. Miller Cowling, Photographic Specialist

A. Photographic Section

A large volume of work was turned out by the photographic section during the past year. Manuals were revised and copies multilithed as follows: Checking Manual 200, Ribes Eradication Manual 400, Ribes Eradication Training Manual 220. For maps and training charts 2,700 yards of black line paper was processed.

The photographer directed the big job of coloring the enlarged pictures used in the ribes eradication training charts. He also assisted a director and photographer from the division of motion pictures in the filming of the northwestern blister rust film and in taking the western scenes for the over-all film.

The following tabulation shows the materials processed by this section:

PHOTOGRAPHIC, MULTILITH, BLACK LINE, AND MIMEOGRAPH WORK

Item	North-western Region	Pacific Coast Region	Pear Psylla Control	Total
PHOTOGRAPHIC				
Lantern slides, natural color	60			60
Films developed, field films	162			162
Copies, 5x7	17	2	72	91
8x10	72	27		99
Printing, 4x5 or smaller		21		21
5x7	1,334	100		1,434
8x10	33			33
9x11	415	514		929
Enlarging, 16x20		226	56	282
22x28	100			100
28x34	65			65
30x40	19			19
Total Items	2,277	890	128	3,295
MULTILITH				
Copies	253	23	7	283
Plates made	251	22	8	281
Cards printed	6,500		7,500	14,000
Cards printed, reverse	3,000		7,500	10,500
Total Cards	9,500		15,000	24,500
Paper printed	157,100	16,800	12,600	186,500
Paper printed, reverse	46,500	1,000	500	48,000
Total Paper	203,600	17,800	13,100	234,500
Total Items	213,604	17,845	28,115	259,564
BLACK LINE PRINTER				
Total maps printed	2,882		1,029	3,911
MIMEOGRAPH				
Total paper	8,695			8,695
Grand Total All Items	227,458	18,735	29,272	275,465

B. Educational Section

Members of the Northwest Conservation League were housed over night at a camp on the Clearwater operation. They were given a talk on white pine blister rust by the operation supervisor, followed by an informal discussion.

The Idaho State Land Board spent a day inspecting blister rust control work on the Clearwater Timber Protective Association. The first part of the ribes eradication training chart series was used to give the board members a background for an understanding of the disease and its methods of control.

When a thorough job of instruction is done by the supervisors in matters pertaining to the disease, a good cross section of the United States is reached since the personnel comprising the eradication crews is recruited from all parts of the country. The visual aid given by the eradication training charts has been of material aid in making these presentations.

Blister rust literature was available to all workers and 153 pamphlets were distributed to visitors in the Spokane office.

Talks, Slides, Displays and Motion Pictures

For 5 weeks a blister rust display occupied a window on the main street of Thompson Falls, Montana. The Balopticon, using a series of slides showing disease, stands of healthy pine and procedures in control work, was the central attraction. Wing panels carried colored display posters. Natural specimens of ribes and pine were shown. Whole and sectioned cankers were on display. The ribes tool and samples of chemicals used in control work were exhibited.

At the Audio-Visual Educational Conference held in Billings, Montana, an exhibit was presented using the Balopticon with a series of blister rust control slides. Colored enlargements of white pine stands and milling scenes formed the background for a display of potted specimens of diseased and healthy pine and ribes. Valuable constructive criticism was received which will be used in developing future exhibits. A similar showing made at the Bonner County fair held in Sandpoint, Idaho, was viewed by large crowds.

The Western blister rust film was shown before approximately 1,000 blister rust workers. Eight other showings were made before 325 people.

APPROPRIATIONS
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
NORTHWESTERN REGION OF BLISTER RUST CONTROL

Regular Appropriations

Fiscal Year 1947:

Project 3101.14 N.W. (Administrative)	$137,500.00	
Project 3103.14 N.W. (Cooperative)	657,711.00	
		$795,211.00

Fiscal Year 1948 (as of 12/31/47)

Project 3101.14 N.W. (Administrative)	$124,000.00	
Project 3103.14 N.W. (Cooperative)	125,000.00	
		$249,000.00

Contributed Funds (deposited with U. S. Treasury)

State of Idaho		$ 15,000.00	
Clearwater Timber Protective Association	$6,422.40		
Potlatch Timber Protective Association	5,420.30		
Priest Lake Timber Protective Association	4,066.54	15,909.24	
			$ 30,909.24

TABLE 1

FEDERAL EXPENDITURES, NORTHWESTERN REGION OF BLISTER RUST CONTROL CALENDAR YEAR 1947, REGULAR APPROPRIATIONS

	Project	Salaries	Expense	Total
	January 1 to June 30, 1947			
I	Planning, Coordination, Technical Direction			
	1.1 - Clearwater Operation, Idaho	$ 6,468.74	$ 177.30	$ 6,646.04
	1.2 - St. Joe Operation, Idaho	8,688.26	494.50	9,182.76
	1.3 - Coeur d'Alene Operation, Idaho	4,030.57	53.90	4,084.47
	1.4 - Kaniksu Operation, Idaho	9,252.73	171.76	9,424.49
	1.6C - Cabinet Operation, Montana	1,140.09	85.94	1,226.03
	1.6K - Kootenai Operation, Montana	1,140.10	85.94	1,226.04
	1.7 - National Parks	2,736.85	395.21	3,132.06
	1.A - Office Maintenance	20,612.27	4,066.96	24,679.23
	1.B - Supervision	6,170.67	835.82	7,006.49
	1.C - Education and Information	3,269.26	41.57	3,310.83
	1.D - Control Investigations	235.00		235.00
	1.E - Methods Development		12.84	12.84
	Total, Project I, Jan. 1 - June 30, 1947	$ 63,744.54	$ 6,421.74	$ 70,166.28
III	Cooperative Ribes Eradication on State and Private Lands			
	3.1 - Clearwater Operation, Idaho	$ 40,647.85	$ 70,578.63	$111,226.48
	3.2 - St. Joe Operation, Idaho	37,907.48	76,910.57	114,818.05
	3.4 - Kaniksu Operation, Idaho	42,519.29	77,028.82	119,548.11
	Total, Project III, Jan. 1-June 30, 1947	$121,074.62	$224,518.02	$345,592.64
	July 1 to December 31, 1947			
I	1.1 - Clearwater Operation, Idaho	$ 4,368.68*	$ 232.84	$ 4,601.52
	1.2 - St. Joe Operation, Idaho	4,923.98*	720.42	5,644.40
	1.3 - Coeur d'Alene Operation, Idaho	*	114.30	114.30
	1.4 - Kaniksu Operation, Idaho	4,903.84*	151.09	5,054.93
	1.6C - Cabinet Operation, Montana	*	74.27	74.27
	1.6K - Kootenai Operation, Montana	*	74.27	74.27
	1.7 - National Parks	4,117.55	789.91	4,907.46
	1.A - Office Maintenance	16,693.15	4,837.38	21,530.53
	1.B - Supervision	6,085.96	444.29	6,530.25
	1.C - Education and Information	2,475.45	165.55	2,641.00
	1.D - Control Investigations			
	1.E - Methods Development		88.26	88.26
	Total, Project I, July 1-Dec. 31, 1947	$ 43,568.61	$ 7,692.58	$ 51,261.19
III	3.1 - Clearwater Operation, Idaho	$ 29,407.57	$ 2,978.51	$ 32,386.08
	3.2 - St. Joe Operation, Idaho	35,177.16	1,814.69	36,991.85
	3.4 - Kaniksu Operation, Idaho	39,546.31	1,085.13	40,631.44
	Total, Project III, July 1-Dec. 31, 1947	$104,131.04	$ 5,878.33	$110,009.37

*Salaries of operation supervisors or assistants for 7/1 - 12/27/47 repaid to our appropriation by Forest Service, not included in these totals.

TABLE 2

SUMMARY OF EXPENDITURES FROM STATE AND PRIVATE FUNDS, 1928 - 1947, IDAHO

Year	State	Private	Total
1928	$ 2,518.55	$ 2,264.32	$ 4,782.87
1929		19,027.66	19,027.66
1930		20,000.00	20,000.00
1931	5,000.00	35,905.32	40,905.32
1932	8,003.43	11,186.33	19,189.76
1933			
1934	29,154.06		29,154.06
1935	15,000.00		15,000.00
1936	16,998.25		16,998.25
1937	15,001.25		15,001.25
1938	15,000.44		15,000.44
1939	15,438.04		15,438.04
1940	10,034.48		10,034.48
1941	7,542.73	15,756.40	23,299.13
1942	22,761.68	15,440.78	38,202.46
1943	12,252.13	386.68	12,638.81
1944	12,506.60	15,612.98	28,119.58
1945	6,287.68	5,111.03	11,398.71
1946	14,943.35	26,651.65	41,595.00
1947	15,028.11	15,909.24	30,937.35
Total	$223,470.78	$183,252.39	$406,723.17

Organization of the Northwestern Regional Office - 1947

1. Regional Leader in Charge, H. E. Swanson, Pathologist

2. Assistant Regional Leader, F. O. Walters, Pathologist

3. Cooperative Local Control:

   a. *Clearwater Operation, Idaho:
      Operation Supervisor, M. C. Riley, Forester
      Assistant Operation Supervisor, H. J. Faulkner, Forester
   b. St. Joe Operation, Idaho:
      Operation Supervisor, H. J. Hartman, Forester
      Assistant Operation Supervisor, W. F. Painter, Pathologist
      Unit Supervisor, R. H. Kliewer, Agent
      Special Duty Assistant, R. E. Myers, Agent
   c. Coeur d'Alene Operation, Idaho:
      Operation Supervisor, A. L. Pence, Jr., Forester
   d. Kaniksu Operation, Idaho-Washington:
      Operation Supervisor, H. A. Brischle, Pathologist
      Unit Supervisor, L. J. Easley, Agent
      Checker Foreman, G. M. Houghton, Agent (resigned 11/10/47)
   e. Montana Operation:
      Operation Supervisor, A. S. Skoglund, Pathologist
   f. National Parks, Washington, Montana, Wyoming:
      Operation Supervisor, J. C. Gynn, Pathologist
      Assistant Operation Supervisor, C. M. Chapman, Pathologist

4. Projects:

   a. Education and Information:
      H. M. Cowling, Photographic Specialist
      J. C. Gonyou, Draftsman
   b. Methods Development and Control Investigation (BLR-1-6):
      V. D. Moss, Forest Ecologist
      J. F. Breakey, Pathologist
      C. R. Stillinger, Pathologist
      R. T. Bingham, Agent
      (Personnel assigned to Northwestern Region by H. R. Offord)

5. Business Administration and Clerical:

   a. E. G. Schmidt, Administrative Assistant
      E. K. LaPrey, Storekeeper
      L. C. Miller, Automobile Mechanic
   b. M. L. McWold, Administrative Assistant
      M. P. Kirsten, Clerk
      M. C. Yourt, Clerk
   c. J. R. Pringle, Clerk (resigned 10/3/47)
      M. Wilson, Clerk
      A. B. Treffry, Clerk-Stenographer
      M. I. Williams, Clerk-Stenographer
   d. L. E. Klatt, Administrative Assistant, Personnel
      K. P. Schofield, Clerk-Stenographer

*F. J. Heinrich, LWOP since 7/1/47